1157

SUPREME COURT OF THE UNITED STATES.

Nos. 209, 314, and 315.

HENRY A. BURR, COMP'T AND APP'T,

vs.

PETER S. DURYEE, HENRY A. JAQUES, AND HENRY W. DURYEE.

No. 314.

SAME vs. SAME.

No. 315.

SAME vs. SAME.

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Circuit court of the United States for the district of New Jersey, in the third circuit—in equity.

To the judges of the circuit court of the United States for the district of New Jersey, in the third circuit:

Henry A. Burr, of the city, county, and State of New York, a citizen of the said State of New York, brings this his bill of complaint against Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, all of the city of Newark, in the county of Essex and State of New Jersey.

And thereupon your orator, humbly complaining, shows unto your honors that heretofore, and before the twenty-fifth day of April, in the year one thousand eight hundred and forty-six, Henry A. Wells, of the said city of New York, a citizen of the said State of New York, now deceased, invented certain new and useful improvements in machinery for making hat-bodies, and in the process of manufacturing hat-bodies, whereof he was the original and first inventor, and which had not been known or used by others before his said invention of the same, nor in public use for more than two year before his application for letters patent therefor, as hereinafter mentioned, nor on sale with his consent or allowance, as such inventor, prior to the said application; and that, being such inventor, and desirous to obtain an exclusive property in the said invention and improvements, he made application to the Commissioner of Patents of the United States for
2 such letters patent, expressing such desire as aforesaid, pursuant to the acts of the Congress of the United States in such case made and provided, and complied therein in all other respects with the requirements of the said acts; and that letters patent were thereupon granted and issued to the said Henry A. Wells, under the seal of the Patent Office of the United States, signed by the Secretary of the Interior, and countersigned by the said Commissioner, in due form of law, bearing date on the said twenty-fifth day of April, in the year one thousand eight hundred and forty-six, whereby there were granted to him, his heirs, administrators, or assigns, for the term of fourteen years from the date thereof, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention and improvements, a description whereof was given in the schedule annexed to the said letters patent therefor, and the drawings accompanying the same, made a part thereof, pursuant to the acts of the Congress of the United States in such case made and provided.

And your orator further shows to your honors, that by and through divers mesne assignments and transfers, the said letters patent, and the right and liberty thereby secured, or intended to be secured, became, and afterwards, and before the thirtieth day of September, in the year one thousand eight hundred and fifty-six, were, the property

of Charles St. John, Albert H. Wright, James M. Riblet, and your orator, all then of the said city of New York, and citizens of the said State of New York, as the owners and holders thereof; that in the said letters patent errors in the specification of the said invention and improvements were incorporated, by reason whereof the said letters patent were inoperative to secure to the said owners and holders thereof the full benefits and advantages of the said invention and improvements, which said errors arose from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention on the part of the said Henry A. Wells; that therefore the said Charles St. John, Albert H. Wright, James M. Riblet, and your orator, being such owners and holders of the said letters patent, and the right and liberty thereby secured, or intended to be secured, as aforesaid, surrendered
3 the said letters patent to the said Commissioner of Patents, and prayed a reissue of the same in two separate and distinct letters patent, upon amended or corrected specifications of the said invention and improvements, according to the acts of the Congress of the United States in such case made and provided; and that thereupon such proceedings were had, that the said letters patent were canceled, and two new and other separate and distinct letters patent were issued to the said Charles St. John, Albert H. Wright, James M. Riblet, and your orator, under the seal of the Patent Office, signed by the Secretary of the Interior, and countersigned by the said Commissioner, in due form of law, one of which bears date on the said thirtieth day of September, in the year one thousand eight hundred and fifty-six, and is designated as reissue No. 396, whereby there were granted to them, their heirs, administrators, or assigns, for the residue of the term of fourteen years from the said twenty-fifth day of April, in the year one thousand eight hundred and forty-six, then unexpired, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention, so far as the same relates to and embraces the said improvements in machinery for making hat-bodies, a description whereof was given in the schedule annexed to the said new and reissued letters patent therefor, and the drawings accompanying the same made a part thereof, pursuant to the acts of the Congress of the United States in such case made and provided; and the other of which bears date on the seventh day of October, in the year one thousand eight hundred and fifty-six, and is designated reissue No. 400, whereby there were granted to them, their heirs, administrators, or assigns, for the residue of the term of fourteen years from the said twenty-fifth day of April, in the year one thousand eight hundred and forty-six, then unexpired, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention, so far as the same relates to and embraces the said improvements in the process of manufacturing hat-bodies, a description whereof was given in the schedule annexed to the said new and reissued letters patent therefor, and the drawings accompanying the same, made a part thereof, pursuant to the acts of the Congress of the United States in such case made and provided.

4 And your orator further shows to your honors, that the said Henry A. Wells departed this life on or about the twenty-sev-

enth day of March, in the year one thousand eight hundred and fifty-one, intestate, leaving him surviving Eliza Wells, of the said city of New York, his widow, and Elizabeth Brewer, wife of Merwin R. Brewer, of the said city of New York, Henry R. Wells, Charles W. Wells, and Caroline W. Wells, all of the city of Brooklyn, in the county of Kings and the said State of New York, his only children and heirs-at-law; that the said Eliza Wells, his widow, thereupon, and on or about the fifth day of January, in the year one thousand eight hundred and fifty-two, was appointed sole administratrix of the estate of the said Henry A. Wells, in due form of law, and took upon herself the burthen of the administration of the said estate; that afterwards, and before the seventeenth day of April, in the year one thousand eight hundred and sixty, the said Eliza Wells, as such administratrix, being desirous of an extension of the said letters patent, so surrendered and reissued as aforesaid, beyond the term of the limitation thereof, made application therefor in writing to the Commissioner of Patents, setting forth the grounds thereof, pursuant to the acts of the Congress of the United States in such case made and provided, and complied therein, in all other respects, with the requirements of the said acts; and that such proceedings were thereupon had, that afterwards, on the said seventeenth day of April, in the year one thousand eight hundred and sixty, the said Commissioner renewed and extended the said letters patent, so surrendered and reissued as aforesaid, for the term of seven years from and after the expiration of the original term for which the same was so granted and issued as aforesaid, that is to say: from and after the said twenty-fifth day of April, in the year one thousand eight hundred and sixty, of which renewal and extension the said Commissioner thereupon granted and issued to the said Eliza Wells, as such administratrix, a certificate bearing date on the said seventeenth day of April, in the year one thousand eight hundred and sixty, signed by him as such Commissioner, and sealed with the seal of the said Patent Office, a copy of which is hereto annexed as Schedule A, (which your orator prays may be taken as a part of this his bill of complaint,) as will more fully and at large appear by the said certificate, now in the possession of your orator, ready to be produced as this honorable court shall direct, and to which, for greater certainty, he prays leave to refer.

And your orator further shows to your honors, that afterwards, and on or about the twenty-third day of April, in the year one thousand eight hundred and sixty, the said Eliza Wells, as such administratrix, for the consideration of one dollar, and other valuable considerations her thereto moving, by an instrument of assignment made and executed under her hand and seal, and bearing date on the day and year last aforesaid, sold, assigned, transferred, and set over to your orator, his heirs, executors, administrators, and assigns, all the right, title, and interest in and to the said renewed and extended term of the said letters patent, so renewed or extended as aforesaid, to be held and enjoyed by your orator, and his legal representatives, to the full end of the said renewed or extended term, in as full and ample a manner as the same could have been held and enjoyed by

her as such administratrix, if the said assignment and sale had not been made; that the said Elizabeth Brewer, and Merwin R. Brewer, her husband, and Henry R. Wells, Charles W. Wells, and Caroline W. Wells, as the children and heirs-at-law of the said Henry A. Wells, on or about the day and year last aforesaid, by an instrument of writing made and executed under their hands and seals, respectively, bearing date on the day and year last aforesaid, acknowledged the sufficiency of the considerations of the said assignment and sale, and confirmed and ratified the same, and transferred to your orator all the right, title, and interest which they had or might have, as heirs of the said Henry A. Wells, in and to the said renewal or extension of the said term, or the said letters patent, copies of which said instruments, respectively, are hereunto annexed as Schedule B, (which your orator prays may be taken as a part of this his bill of complaint,) as will more fully and at large appear by the said instruments, respectively, now in possession of your orator, ready to be produced as this honorable court shall direct, and to which, for greater certainty, he prays leave to refer.

6 And your orator further shows to your honors, that the said instruments of writing, respectively, were duly recorded in the said Patent Office, on or about the twenty-sixth day of April, in the year one thousand eight hundred and sixty, as will more fully and at large appear by the certificate of the registry thereof, by the Commissioner of Patents indorsed thereon, and to which, for greater certainty, he prays leave to refer.

And your orator further shows to your honors, that in the said reissued letters patent, respectively, errors in the specifications of the said invention and improvements, accompanying and making part of the same, respectively, were incorporated, by reason whereof the said reissued letters patent, respectively, were inoperative to secure to your orator, as the owner and holder thereof, the full benefits and advantages of the said invention and improvements, which said errors arose from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention on the part of the said Henry A. Wells, or the said Charles St. John, Albert H. Wright, James M. Riblet, and your orator, or either of them; that, therefore, your orator, being such owner and holder of the said letters patent, so reissued as aforesaid, and the rights and liberties secured or intended to be secured thereby, respectively, as aforesaid, surrendered the said reissued letters patent to the said Commissioner of Patents, and prayed a reissue of the same upon amended or corrected specifications of the said invention and the said improvements, respectively, according to the acts of the Congress of the United States in such case made and provided; and that thereupon such proceedings were had, that the said reissued letters patent were canceled, and two new and other separate and distinct letters patent were issued to your orator, under the seal of the Patent Office, signed by the Secretary of the Interior, countersigned by the said Commissioner, bearing date on the fourth day of December, in the year one thousand eight hundred and sixty, and designated as reissues No. 1086 and 1087, respectively, whereby there were granted to your orator, his heirs, administrators, or assigns, for the

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residue of the said renewed or extended term of seven years,
7 then unexpired, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention, and the said improvements, respectively, descriptions whereof are given in the schedules annexed to the said last-mentioned new and reissued letters patent, and the drawings accompanying the same made part thereof, respectively, pursuant to the acts of the Congress of the United States in such case made and provided, copies of which said last-mentioned new and reissued letters patent, and of the schedules and drawings accompanying the same, are hereto annexed as Schedules C and D, (which your orator prays may be taken as a part of this his bill of complaint,) as will more fully and at large appear by the said last-mentioned new and reissued letters patent, now in the possession of your orator, ready to be produced as this honorable court shall direct, and to which, for greater certainty, he prays leave to refer.

And your orator further shows to your honors, that the said invention and improvements, secured, or intended to be secured, by the said original letters patent, and by the said new and reissued letters patent first hereinbefore mentioned, and the said new and reissued letters patent last hereinbefore mentioned, were the same identical invention and improvements as were originally and first invented by the said Henry A. Wells, and described in the specification of the same, annexed as a schedule to the said original letters patent, and made a part of the same; and that from and after the issuing of the said original letters patent, the said Henry A. Wells, and the other owners of the same, since that time hitherto have put and had the said invention and improvements in use, and that your orator is now the sole and exclusive owner and possessor of the same.

And your orator further shows to your honors, that the licensees hereinafter mentioned, or the said defendants, at divers times since the year one thousand eight hundred and forty-eight, before, and in the year one thousand eight hundred and sixty, have constructed, or caused to be constructed, six machines, for the purpose of making hat-bodies, and have used, and the said defendants now continue to use some or all of such machines in the manufacture of hat-bodies, in direct violation of your orator's rights, secured by the said letters
8 patent, as aforesaid, and, so far as your orator knows, and as he believes, without any claim of license from your orator; that in addition to such six machines, so constructed, or caused to be constructed, as aforesaid, the said defendants are also using two other machines in the manufacture of hat-bodies, which they claim to be working in accordance with certain agreements hereinafter referred to, but which they are in fact using in direct violation of your orator's rights, secured by the said letters patent, and without his license or permission, and are also practicing and using the process of forming hat-bodies, described and claimed in the said reissued letters patent, No. 1086, by the aid of some or all of such machines. And your orator has requested the said defendants to desist from the further use of all and every of such machines, and of such process, in violation of your orator's rights as aforesaid; but they utterly refuse so to do; and

they pretend, as to two of the said machines, that they have a right to use the same under a certain license granted to the said Peter S. Duryee and Henry H. Jaques, together with James B. Pinneo and Isaac N. Rankin, by your orator, and by Charles St. John, Alva B. Taylor, and Norman Reynolds, on the seventh day of November, in the year eighteen hundred and forty-eight, by an agreement in writing of that date, and which said license has been conveyed by the licensees therein mentioned to the said defendants, Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, as successors of the said licensees, and confirmed to them by your orator on the tenth day of December, in the year eighteen hundred and fifty-nine, by an agreement in writing of that date, which two agreements are in the words following to wit:

Articles of agreement between Charles St. John, Henry A. Burr, and Alva B. Taylor, of the city and county of New York, and Norman Reynolds, of the county of Columbia and State of New York, parties of the first part, and Peter S. Duryee, James B. Pinneo, Isaac N. Rankin, and Henry H. Jaques, copartners, constituting the firm of Rankin, Duryee & Co., of the city of Newark, county of Essex, and State of New Jersey, parties of the second part.

Whereas the parties of the first part are the rightful and sole owners of an invention and improvement in machinery for making fur hat-bodies, patented to Henry Augustus Wells, on the twenty-fifty day of April, one thousand eight hundred and forty-six, by letters patent of the United States then granted to the said Wells, and have the exclusive right to construct, use, and sell, and to authorize others to construct and use the said improvement; and whereas the said parties of the second part being such copartners, trading together in the city of Newark, under the said name, style, and firm of Rankin, Duryee & Co., are engaged in the manufacture, finishing, and sale of hats, and are desirous of obtaining the full and perfect right to use the said machine in their said business:

Now, therefore, this instrument witnesseth, that for the consideration hereinafter mentioned the said parties of the first part do hereby empower and authorize the said parties of the second part, as such copartners as aforesaid, to use either one or two machines, constructed according to said patent, and with all such improvements as the said parties of the second part may desire, which have hitherto been made to the said invention, as originally patented as aforesaid, or which may hereafter be made thereto, and be under the control of the said parties of the first part, or any of them, such machine or machines to be used and employed by the said parties of the second part in their copartnership business; and whenever any one or more of the said parties of the second part shall be desirous of withdrawing from said firm of Rankin, Duryee & Co., he may transfer his interest under this contract to such of said parties of the second part in common as remain in the said firm; and if at any time the copartners in said firm for the time being shall be desirous of taking, and shall take into the said firm one or more additional copartners,

they may assign to such person or persons, as copartners, an undivided share of the interest under this contract; or in case all the copartners for the time being in said firm shall at any time desire to transfer all their rights and interests under this contract to some other individual, firm, or company, they may do so; it being the intention and agreement of the parties to these presents that the said one or two machines may for all time to come be used in the said city of Newark, and there only, and by one manufacturing concern, and one only, whether it be carried on by one individual severally, or by several individuals jointly, and that they be used only for manufacturing such hat-bodies as shall be finished off for sale by said manufacturing concern, and for the manufacture of such hat-bodies as shall be used by them in the way of barter for such finished or partly finished hats as they may procure for the purpose of sale, in the fair and usual course of their business, and not in forming hat-bodies for any other person, or for sale in an unfinished state.

And to the end that the parties of the first part may at all times know who are entitled to the rights under this contract, it is hereby stipulated and made a part of this agreement that no individual shall own or be interested in the use of said machines, or be entitled to any right under this contract, (except the said original parties of the second part,) without having an assignment thereof, or of some part thereof, in writing. And the parties of the second part, or those interested in this contract for the time being, as assignees or owners thereof, shall in every case of an assignment of any right or interest therein, forthwith give notice in writing of such assignment to the parties of the first part, specifying the name and residence of the assignee, and the quantity or proportion of interest assigned to him, with the date of the assignment. And it is further agreed by and between the parties hereto, that in case of any assignment, transfer, or permitted use of any right or interest under this contract, otherwise than by a written assignment; or in case of failure to give notice of such assignment to the parties of the first part, as above
11 specified; or in case of the use of the said machines for manufacturing hat-bodies for other persons, or for sale in an unfinished state; or in case of failure to pay the sum herein and hereby stipulated to be paid for the use of said machine or machines, for the space of more than thirty days after the time herein stipulated for such payment, this contract shall cease and become void, and shall be thereby absolutely canceled.

And the said parties of the second part, in consideration of the foregoing covenants and agreements, do hereby, for themselves, their heirs, executors, and administrators or assigns, jointly and severally, covenant and agree to and with the said parties of the first part, and their representatives, that they will to them well and truly pay for the use of the said machine or machines, and all the said improvements thereto, at and after the rate of five hundred dollars per annum, for such period as they or their assignees, as herein above specified, shall continue to use the said machine or machines, such payments to be made quarterly; it being, nevertheless, understood that the said parties of the second part, or their said assignees,

shall be at liberty to discontinue the use and surrender the right to use the said invention at any time they may see proper to do so, giving immediate notice thereof to the parties of the first part. And the said parties of the second part do further covenant, as aforesaid, that they or their said assigns will not use, and will not authorize or permit the use of the said machine or machines, or any of the said improvements thereto, for any other purpose than for the forming of hat-bodies to be by them finished and sold or bartered as aforesaid, in the fair and regular course of their business, and not for manufacturing hat-bodies for other persons or firms, or for sale in an unfinished state.

The said party of the second part, for themselves, their executors, administrators, and assigns, do covenant and agree that the said parties of the first part, or any of them, and their assigns, shall, at all reasonable times, have free access to the said machinery, and to have full opportunity to see the said machines, so as to ascertain whether the same are run and used according to the stipulations of this agreement, it being understood that partners retiring from
12 the firm, and surrendering their interest in the same, shall not be held responsible under this contract for the annual payment of five hundred dollars, or in any other respect.

In witness whereof, the said parties have hereunto set their respective hands and seals the seventh day of November, one thousand eight hundred and forty-eight.

CHARLES ST. JOHN. [L. S.]
H. A. BURR. [L. S.]
A. B. TAYLOR. [L. S.]
NORMAN REYNOLDS, [L. S.]
By EDWARD CLARK, *his Attorney.*
P. S. DURYEE. [L. S.]
JAMES B. PINNEO. [L. S.]
I. N. RANKIN. [L. S.]
H. H. JAQUES. [L. S.]

Signed, sealed, and delivered in the presence of—
H. W. DURYEE.

Memorandum of an agreement made and entered into this 10th day of December, in the year 1859, by and between Henry A. Burr, of the city, county, and State of New York, of the first part, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, of Newark, in the county of Essex and State of New Jersey, constituting the firm of Duryee, Jaques & Co., of the said Newark, parties of the second part, successors to the firm of Rankin, Duryee & Co., witnesseth: That whereas, on the 7th day of November, 1848, an agreement was made and entered into by and between Charles St. John, Henry A. Burr, Alva B. Taylor, and Norman Reynolds, (by his attorney, Edward Clark,) of the first part, and P. S. Duryee, James B. Pinneo, Isaac N. Rankin, and Henry H. Jaques, constituting the firm of Rankin, Duryee & Co., whereby the said party of the first part, as assignee of letters patent granted to Henry A. Wells, for improve-

ments in the process of, and machinery for, making hat-bodies, bearing date the 25th day of April, 1846, conveyed to the said
13 firm of Rankin, Duryee & Co., and the successors of them, a right or license under the said letters patent, on certain conditions and restrictions therein fully specified; and whereas the term for which the said letters patent are granted is about to expire, and the said party of the second part are desirous that the term of the said patent may be renewed or extended, and that the before-recited agreement may also be extended during the term of any extension or renewal of the said letters patent, which may be hereafter granted; and whereas the said Henry A. Burr, party of the first part, has entered into an agreement with the heirs and the administratrix of the said Henry A. Wells, deceased, to the effect that he will by his means aid in obtaining an extension or renewal of the said letters patent, and pay to the said heirs, and the said administratrix a certain specified sum for the said extended term, if so granted, to the end that the exclusive right, title, and interest in and to the said letters patent, for and during such extended term when granted, shall vest in him, the said Henry A. Burr:

Now, therefore, be it remembered, the premises considered, that for and in consideration of one dollar, lawful money of the United States, each to the other paid, and of the premises and other valuable considerations thereunto moving, the receipt whereof is hereby acknowledged, it is mutually agreed by and between the parties to these presents as follows:

First. The said party of the first part hereby agrees to and does bind himself and his successors unto the party of the second part, that if the said letters patent granted unto Henry A. Wells, and bearing date the 25th day of April, 1846, and the reissues thereof, bearing date severally the 30th day of September and the 7th day of October, 1856, and granted for the unexpired term of the said original patent, shall be extended for the further term of seven years from and after the 25th day of April, 1860, and transferred to him, the party of the first part, that he, the said party of the first part, will, and he does hereby, grant unto the said party of the second part, for and during such extended term, all the rights and privileges which they, the said party of the second part, now possess under the said letters patent, during the present term thereof, by virtue of the before-recited
14 agreement or license.

Second. And the said party of the second part hereby agree with and bind themselves, severally and jointly, and their successors, unto the said party of the first part, and his successors, that they and their successors shall well and truly pay unto the party of the first part, or his successors, for the privileges hereby granted or intended to be granted, for and during any extended term of the said letters patent, which they are required to pay under the present term, as provided in the before-recited agreement or license, and they will abide by and fully perform, during such extended term, the like conditions and obligations as are now imposed and required of them by the terms of the before-recited agreement, bearing date the 7th day of November, 1848.

In witness whereof, we have hereunto set our hands and seals the day and year first above written.

HENRY A. BURR. [L. S.]
P. S. DURYEE. [L. S.]
HENRY H. JAQUES. [L. S.]
HENRY W. DURYEE. [L. S.]

In presence of—(the words "heirs and the said," on thirty-first line on first page, interlined before execution)—

J. E. JANSEN.
THOS. A. STAYNER.

But your orator charges the fact to be that the said defendants have no right or title to use the said two machines, or any other machines, under the said agreements, because the same have become void, and absolutely canceled and annulled by the acts of the parties thereto, as hereinafter mentioned; and your orator has given due notice to the said defendants that the said agreements are so canceled and annulled, and has ever since refused to accept any payment thereunder. And the said defendants sometimes pretend that the said license and agreements are still in force and effect; but your orator charges the contrary to be true, and shows unto your honors that, by the terms of the said license, your orator and his said asso-
15 ciates, who made the said agreement first mentioned, did so for an extremely small money consideration, to wit, for the consideration of five hundred dollars a year for the use of one or two machines, which consideration is not more than one-seventh, in money value, of the amount which your orator and his said associates received from other persons to whom they granted licenses to use the said improvements; and that the chief consideration therefor, contemplated by your orator and his said associates, was the co-operation and aid which the licensees, under the said agreement, and their successors, were able to afford them in sustaining and defending their rights against infringers, by means of the influential position and extensive business connection of the said licensees and their successors; and that the said licensees reserved to themselves and their successors, by the said agreement, the right to surrender the said license to your orator at their will and pleasure, and without any compensation, and to reoccupy the same position which they occupied before the execution of the said license; but that your orator and his associates, on their part, were authorized, by the said agreement, to abandon the same, only in case of failure, on the part of the said licensees or their successors, to perform the same, or a violation, on their part, of the terms of the same.

And your orator further shows to your honors, that soon after the making of the said first-mentioned agreement, he and his said associates furnished to the said original licensees under the same, two machines, as contemplated thereby, and afterwards replaced one of the said two machines by another; that the said licensees, or the said defend-

ants, have constructed, or caused to be constructed, without authority, by or under the said agreements, or either of them, and without the license or permission of your orator, two machines in addition to the two so furnished, and the one so replaced as aforesaid, under the said agreement, which said two additional machines, so constructed, or procured to be constructed, by the said licensees or the said defendants, the said defendants do not deny to be made, and to operate in accordance with your orator's said letters patent; and that the said original licensees, or the said defendants, with the aid of the said two
16 additional machines, have been manufacturing large quantities of hat-bodies, to be finished by themselves, and have manufactured, and the defendants now are manufacturing, hat-bodies, with the aid of the same, for other persons, or for sale in an unfinished state, in direct competition with your orator, and in direct violation of the terms of the said license.

And your orator further shows to your honors, that the said defendants also have been and are manufacturing hat-bodies for other persons, or for sale in an unfinished state, upon the said other four machines, which are constructed according to the said letters patent of your orator, although differing in the form of some of the details, and thereby competing directly with your orator in the manufacture of hat-bodies, and depriving him of the chief consideration for which he and his said associates executed the said agreements, and without which they would not have executed the same, whereby the said defendants have forfeited and lost all rights under the said agreements, and authorized your orator to exercise his option of canceling the said license according to the terms thereof which he has exercised, and by virtue of which he has declared the said license and agreements to be canceled and void.

And sometimes the said defendants pretend that your orator has acquiesced in the violation by the original licensees, and by them of the terms of the said license as aforesaid. But your orator charges the contrary to be true, and avers that he was not informed, and did not know, until very recently, that they were so violating the said agreement and the terms of the said license; and that upon the first occasion which offered after his knowledge of the said violation, he refused to recognize the existence of the said license or agreements, or to receive any pay thereunder, and notified the said defendants that he held the said license as forfeited by them and void, and that he should proceed against them as common infringers.

And sometimes the said defendants pretend that they are entitled to construct and use machines for forming hat-bodies involving and embracing the said improvements invented by the said Henry A. Wells, the title whereof has been assigned to and is now owned by your orator as aforesaid, and to contest the validity of the said
17 letters patent so granted to your orator, and at the same time to hold under the said agreements the right to use one or two of such machines upon the terms of the said license. But your orator charges the contrary to be true, and insists that the said defendants are estopped by the said agreements from defending against the validity of the said letters patent of your orator, and are concluded by

the said agreements from making or using any machine or using any mode of operation or process substantially the same as those invented by the said Henry A. Wells as aforesaid, or either of them.

And sometimes the said defendants pretend that the said last-named four machines made by them are different from that invented by the said Henry A. Wells, and that the mode of operation and process practiced by them in the making of hat-bodies, by and with the use of such machines, is substantially different from the mode of operation invented by the said Henry A. Wells, and secured by the said letters patent to your orator as aforesaid. But your orator charges the fact to be, that both the construction of the said machines and the mode of operation and process practiced in using the same, and in making hat-bodies, are substantially like the invention of the said Henry A. Wells as aforesaid, and differ therefrom only in formal and immaterial particulars. All which actings, doings, and pretences are contrary to equity and good conscience, and tend to the manifest wrong and injury of your orator in the premises; and that your orator has requested the said defendants to desist from such violation and infringement, but in vain.

And your orator further shows to your honors, that in a certain suit in the circuit court of the United States for the eastern district of Pennsylvania, in equity, wherein your orator, and the said Charles St. John and Alva B. Taylor were complainants, and the said Charles St. John and Alva B. Taylor were complainants, and E. T. Mead and others were defendants, a final decree was entered against the defendants therein in favor of the said complainants, affirming and establishing that the said Henry A. Wells was the first and original inventor of the said invention and improvements, and that the said letters patent, so granted to him as aforesaid, were valid; that the issues of fact involved in the said suit, affecting the question
18 of the validity of the said letters patent, so granted to the said Henry A. Wells, were tried by a jury under the order of the court, and found by the said jury in favor of the said complainants; that the said decree, which was thereupon made, is now in full force and effect; and that afterwards injunctions against alleged infringements of the said invention and improvements have been ordered and are now in full force and effect in the several suits following, to wit: a suit in the circuit court of the United States for the district of Massachusetts, at the suit of the same complainants, against Christian Raake, defendant; a suit in the court last-mentioned, at the suit of the same complainants, against Brown and Gill, and another; a suit in the circuit court of the United States for the southern district of New York, at the suit of the same complainants against James H. Prentice, and others; and a suit in the ciriuit court of the United States for the said district of New Jersey, at the suit of your orator and others, against Alva B. Taylor and another.

In consideration whereof, and forasmuch as your orator can have adequate relief only in this court, where matters of this sort are properly cognizable and relievable, and to the end therefor that the said defendants may, upon their several and respective corporal oath, and to the best of their knowledge, information, and belief, respectively, direct and perfect answer make to all the matters and things

hereinbefore set forth, and that as fully and particularly as if the same were here again repeated and they particularly interrogated thereto; and that they may be enjoined and restrained by a writ of injunction, issued out of and under the seal of this court, from making, constructing, or causing to be made or constructed, using, or vending to others to be used, any machine or machines, such as they are now using, as hereinbefore set forth, or such as are substantially similar to or embody the said invention and improvements, so secured as aforesaid by the said reissued latters patent No. 1087, and so assigned to and owned by your orator as aforesaid; and also from practicing or using the process or mode of operation in the formation of hat-bodies, secured to your orator as aforesaid in the said reissued letters patent No. 1086; and that they may be decreed to deliver
19 up to complainant or destroy any and all such machine and machines and to account for and pay over to your orator the gains and profits by them made by the use of the said machines as aforesaid since the fourth day of September, in the year one thousand eight hundred and sixty; and that your orator may have such other and further relief as may be consistent with equity and good conscience.

May it please you honors, the premises considered, to grant to your orator, not only a writ of injunction, issuing out of and under the seal of this court, enjoining and restraining the said defendants from making, constructing, or causing to be made or constructed, using, or vending to others to be used, any machine or machines such as they are now using as aforesaid, or such as are substantially similar to or embody the said invention and improvements, so secured as aforesaid, or any or either of the same, and from practicing and using the said process in the formation of hat-bodies; but also a writ of subpœna, issuing out of and under the seal of this court, commanding them to appear at a certain time and place in this court, to answer the premises, and to stand to and abide such orders and decrees herein as may be consistent with equity and justice.

And your orator, as in duty bound, will ever pray, etc.

HENRY A. BURR.

UNITED STATES OF AMERICA, *ss:*

Southern district of New York, city, county, and State of New York.

Henry A. Burr, the complainant in the foregoing bill of complaint named, being duly sworn, says that the matters and things set forth in the said bill, so far as they relate to his own acts and deeds, are true; and so far as they relate to the acts and deeds of any other person or persons, he believes them to be ture.

HENRY A. BURR.

Sworn and subscribed before me this 26th day of February, 1861.

R. E. STILLWELL,
U. S. Commissioner.

21 *Certificate of extension.*

SCHEDULE A.

Whereas, upon the petition of Eliza Wells, administratrix of Henry A. Wells, late of New York, N. Y., for an extension of the patent granted to said Henry A. Wells, on the twenty-fifth day of April, 1846, which patent was surrendered and reissued in two separate patents based on separate amended specifications, to wit: Reissue No. 396, dated September thirtieth, 1856, for improvement in machinery for making hat-bodies, and reissue No. 400, dated October seventh, 1856, for improvement in manufacturing hat-bodies, the undersigned, in accordance with the eighteenth section of the act of Congress approved the fourth day of July, 1836, entitled "An act to promote the progress of the useful arts, and to repeal all acts and parts of acts heretofore made for that purpose," and the act approved the twenty-seventh day of May, 1848, entitled "An act to provide additional examiners in the Patent Office, and for other purposes," did on the seventeenth day of April, 1860, decide that said patent ought to be extended:

Now, therefore, I, Philip F. Thomas, Commissioner of Patents, by virtue of the power vested in me by said acts of Congress, do renew and extend the said patent reissued in said two patents herein above designated, and certify that the same is hereby extended for the term of seven years from and after the expiration of the first term, viz: from the twenty-fifth day of April, 1860, which certificate being duly entered of record in the Patent Office, the said patent has now the same effect in law as though the same had been originally granted for the term of twenty-one years.

In testimony whereof, I have caused the seal of the Patent Office to be hereunto affixed this seventeenth day of April, 1860, and of the independence of the United States the eighty-fourth.

PHILIP F. THOMAS,
[L. S.] *Commissioner.*

23 *Assignment.*

SCHEDULE B.

Whereas letters patent of the United States have been granted unto Henry Augustus Wells, bearing date the twenty-fifth day of April, 1843, for his invention of machinery and process for the manufacture of hat-bodies, which said letters patent, by assignment, became vested in Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, who, as such assignees, surrendered the same on account of a defective specification, and applied for and procured the same to be divided and reissued, and two amended patents to be granted, one for the said invention of machinery for forming fur hat-bodies on pervious cones or formers, and bearing date the thirtieth day of September, 1856; and the other for the process of hardening the same, which said reissue bears date the seventh day of October, 1856, and both of which said reissues are granted for the

unexpired term of fourteen years, for which the said original letters patent were granted:

And whereas Eliza Wells, after the decease of the said Henry A. Wells, was duly appointed administratrix of the estate of the said Henry Augustus Wells:

And whereas the before-recited letters patent so granted to the said Henry A. Wells, and bearing date the twenty-fifth day of April, 1846, and so divided and reissued as aforesaid, have been renewed and extended for the further term of seven years from and after the expiration of the original term of fourteen years, that is to say, from and after the twenty-fifth day of April, 1860, and such renewed or extended term is granted unto me, the said Eliza Wells, as administratrix of the estate of said Henry Augustus Wells, deceased:

And whereas Henry A. Burr, of the city, county, and State of New York, is desirous of acquiring all the right, title, and interest in and to the said extended or renewed term of the said letters patent:

Now, therefore, be it known, that for and in consideration of one dollar, lawful money of the United States, and other valuable considerations me thereunto moving, the receipt whereof is hereby
24 acknowledged I have sold, assigned, transferred, and made over, and by these presents do sell, assign, transfer, and make over, unto the said Henry A. Burr, his heirs, executors, administrators, and assigns, all the right, title, and interest in and to the said extended or renewed term of both of the said letters patent, so extended and renewed as aforesaid, the said reissued patents being severally numbered 396 and 400, and being reissues as aforesaid of the before-recited letters patent granted to Henry A. Wells, and bearing date the twenty-fifth day of April, 1846, the same to be held and enjoyed by the said Henry A. Burr, and his legal representatives, to the full end of the said renewed term, namely, from the twenty-fifth day of April, 1860, to the twenty-fifth day of April, 1867, in as full and ample manner as the same could have been held and enjoyed by me, as such administratrix, if this assignment and sale had not been made.

In testimony whereof, I have hereunto set my hand and seal this twenty-third day of April, 1860.

ELIZA WELLS. [L. S.]

In presence of—
CHARLES M. KELLER.

Be it known that we, Elizabeth Brewer, daughter of Henry A. Wells, deceased, and Merwin R. Brewer, her husband, of the city, county, and State of New York; Henry R. and Charles W. Wells, of Brooklyn, in the county of Kings and State of New York, sons of the said Henry A. Wells; and Caroline W. Wells, also of said Brooklyn, daughter of the said Henry A. Wells, as joint heirs of the said Henry A. Wells; and Eliza Wells, his widow, duly appointed administratrix of the estate of the said Henry A. Wells, do jointly and severally confirm and ratify the above sale and transfer to Henry

A. Burr, of the city, county, and State of New York, of all the right, title, and interest which we had or might have, as heirs of the said Henry A. Wells, in and to the extension or renewal of the term of the two patents therein named, being reissues numbers 396 and 400, of letters patent granted to the said Henry A. Wells, on the twenty-fifth day of April, 1846, for improvements in the process and machinery for the manufacture of hat-bodies, hereby acknowledging the sufficiency of the consideration for which the said assignment was made.

In witness whereof, we have hereunto set our hands and seals this twenty-third day of April, 1860.

ELIZABETH BREWER. [L. S.]
M. R. BREWER. [L. S.]
HENRY R. WELLS. [L. S.]
CHARLES W. WELLS. [L. S.]
CAROLINE W. WELLS. [L. S.]

In presence of—
CHARLES M. KELLER.

U. S. PATENT OFFICE.

Received and recorded April 26, 1860, in Liber R 5, page 399, of Transfer of Patents. In testimony whereof, I have caused the seal of the Patent Office to be hereunto affixed.

[L. S.] PHILIP F. THOMAS,
Commissioner of Patents.

27 *Wells's patent for process.*

SCHEDULE C.

Reissue No. 1086.

The United States of America to all to whom these letters patent shall come:

Whereas Henry A. Burr, of New York, N. Y., assignee through mesne assignments of Henry A. Wells, deceased, has alleged that said Henry A. Wells did, in his lifetime, invent a new and useful improvement in manufacturing hat-bodies, (for which letters patent were issued to said Wells, dated April 25th, 1846, the same surrendered, and new letters issued to Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, as assignees of said Wells, dated October 7th, 1856, the same extended for seven years from and after April 25th, 1860, which last letters having been surrendered by said Burr, the same have been canceled, and new letters ordered to issue to him on an amended specification,) which he stated had not been known or used before his application, had made oath that he was a citizen of the United States; that he did verily believe that he was the original and first inventor or discoverer of the said improvement; and that the same had not, to the best of his knowledge and belief, been previously known or used—said Burr having paid into the treasury of the United States the sum of fifteen dollars, and presented a

petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Henry A. Burr, his heirs, administrators, or assigns, for the term of twenty-one years from the twenty-fifth day of April, one thousand eight hundred and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words
28 of the said Henry A. Burr, in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.
[L. S.]

Given under my hand, at the city of Washington, this fourth day of December, in the year of our Lord one thousand eight hundred and sixty, and of the independence of the United States of America the eighty-fifth.

JACOB THOMPSON,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.
PHILIP F THOMAS *Commissioner of Patents.*

Wells's specification to patent for process.

THE SCHEDULE REFERRED TO IN THESE LETTERS PATENT, AND MAKING PART OF THE SAME.

To all whom it may concern:

Be it known that Henry A. Wells, late of the city, county, and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in the process of making hat-bodies of fur, for which said improvements, in connection with machinery for forming the bats, letters patent of the United States were granted to the said Wells, bearing date the twenty-fifth day of April, 1846; and that the following is a full, clear, and exact description of the principle or character which distinguishes the said invention from all other things before known, and of the manner of working the same, reference being had to the accompanying drawings, making part of this description, in which

Figure 1 is a plan of the machine;

Figure 2, a longitudinal vertical section; and

Figure 3, a longitudinal elevation.

29 The other figures will be described in their appropriate places.

The same letters indicate like parts in all the figures.

Prior to the invention of the said Henry A Wells, fur hat-bodies were made by what is known as the "bowing process," by which two flat bats were separately formed and then united at the edges, and then hardened and felted; and although attemps had been made

to avoid the difficulties presented by this process, such attempts were not successful, so that, at the date of the said invention of the said Wells, the bowing process was the only one practically used in the manufacture of fur hat-bodies. By the invention of the said Henry A. Wells, fur hat-bodies are made directly of the required form, and in a suitable condition for the after process of sizing by felting; and the said invention consists in effecting this result by the combination of two consecutive processes, the first of which is to form a bat of fur fibres of the required thickness by depositing the fur on to the surface of a pervious cone or former connected with an exhausting apparatus to exhaust the air from the inside thereof, that the fur fibres so deposited may be held thereon by the pressure of the surrounding air. And the second of which processes is to harden the bat of fur fibres so formed, while on the said pervious cone or former, by partially felting the same while on such cone or former, to give it the required consistency to admit of taking it off in a suitable condition for the after and usual process of sizing by felting. By means of this combination of processes, fur hat-bodies can be made directly of the form and of any varying thickness required.

The following is a description of the means suitable for applying the said combined process to practice, although other and equivalent means may be employed for working the combined process invented by the said Wells. Having thus pointed out the principle or character of the said invention of the said H. A. Wells, the special mode of application will be next described. The first branch of the said process may be worked by means of a machine represented in the accompanying drawings, and which is believed to be the best means, although other and equivalent means may be employed for the purpose, and no claim is herein made to the machinery described, as that is claimed in another patent.

In the accompanying drawings, A represents a frame properly adapted to the operative parts of the machine; and B the lower feed-apron, on which the stock or fur is spread by the attendant in separate parcels, each sufficient for the formation of a hat, according to its intended weight. This apron or endless belt of cloth, or other suitable material, passes around a roller C and a lip D, the former at the back of the machine, with its bearings in sliding boxes governed by set-screws E E, for the purpose of tightening this apron, and the latter near to the rotating picking-brush F, and so formed as to present a slightly rounded edge to the apron to pass over, where it presents the fur to the action of the picking-brush. Instead of this slightly rounded edge, a small metallic roller may be substituted; but when this is done, the roller should be supported at different points between its end journals by letting it run in a circular groove in the lip, as represented in section at figure 4, where G indicates his roller. The fur, as it is carried along towards the lip D, is gradually compressed by the upper apron B^1, which passes around a feed-apron C^1 and a lip D^1, in manner similar to the under feed-apron. The roller C^1 runs in a frame I, of which the lip D^1 forms part, hung on journals that rest in standards J, so that the lip D^1 can be made to press on to the fur, between it and the under lip D, and thus gripe

the fibres and present them to the effective action of the picking-brush F. The under plane of the upper apron B^1 is inclined to the upper plane of the lower one B, the more effectually to present the fibres in the proper manner to the picking-brush.

The roller C^1, of the upper apron, runs in sliding boxes, governed by set-screws E^1 E^1, and is placed forward of the journals of the frame, so that the tension of the belt I^2, which communicates motion from the lower roller C to the upper one C^1, may press the upper lip D^1 on the under lip D; but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure under similar circumstances. The fibres, as they pass from the feed-aprons, are acted upon by a brush F that rotates with great velocity,

31 and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed, if desired. As the fibres are first presented, they are brushed and properly laid by the downward action of the brush, as indicated by the arrow, and, when liberated, are carried down the curved surface L of a chamber or tunnel M, and at the lower edge of this they meet a current of air that enters a narrow aperture N near the bottom of the chamber, and extending the whole length of the picking-brush, which, being induced by the rotation of the picking-brush, and the partial vacuum in the perforated cone O, aids in carrying and giving direction to the fur-bearing current towards the surface of the perforated cone O. This chamber extends over and under the picking-brush and the forward part of the lips, and turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush. Its bottom rests on a set-screw P, to regulate the delivery end of the fur at or near the base of the cone. Its forward end, in addition to this, is provided with a hinged hood Q, regulated by a cam lever or other suitable means to regulate the delivery of the fibres at and near the base of the cone. The top R of this trunk is gradually elevated, and its sides are contracted to make the delivery aperture nearly of the form of the cone, but narrower and higher, and its upper part is provided with a hood S, so curved as to correspond generally with the curve of the tip of the cone; this hood is hinged to the upper part of the delivery aperture of the chamber, and is connected with an eccentric T by means of a cord U that passes over a pulley V, which cord is attached to a bell-crank U^1, so that each revolution of this eccentric carries the hood up and down to direct the discharge, and distribute the fibres on to the cone, a greater thickness being desirable in the parts of the bat which form the brim, than on the tip and crown; and when it is desired still further to diversify the distribution of the fibres, other means can be substituted for the eccentric, and the connection between it and the deflector is formed as represented in section at figure 5, where the cam T acts on the lever

T^1 connected by the cord U.

32 The cone O is made in the usual manner, but of thin sheet metal perforated; that being deemed better than wire gauze. Its lower edge fits in a metallic ring W that runs in an appropriate collar in the upper part of a case X, and its outer periphery is

provided with cogs that mesh into the cogs of a pinion Y, concealed in the drawing by the pulley D^2 on a vertical shaft Z, by which a slow rotary motion is given to the cone, as the fibres are thrown on to it, to distribute them equally all around the cone. The case X may be made sufficiently long to receive two rings W, one on each side of the pinion Y, by which both are kept in motion, and it (the case) may be made to swivel on a hollow collar F^1, to which its bottom is fitted, so that when one cone is covered it may be turned aside by turning the case half a revolution, and another cone put on to the other ring, that another bat may be in the process of forming, whilst the one already formed may be prepared for the hardening process in the manner to be hereafter described. The case X communicates through the hollow collar F^1 with an exhausting fan-blower G^1, which consists of a vertical arbor H^1 with oblique vanes I^1, so that when rotating with great velocity in the direction of the arrow the air is exhausted from the case X, and the inside of the perforated cone O. When one of the cones is removed from one of the rings W to be taken to the hardening apparatus, the aperture in the ring W must be closed up with a cap-plate W^2 to prevent the passage of air. Any other mode of exhausting the case and cone may be employed, but this is deemed the best.

All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying drawings, in which M^1 is a main line shaft overhead, driven by any first mover. From a wheel N^1 on it a band O^1 extends to a pulley P^1 on the shaft of the brush, which should make about two thousand revolutions per minute, more or less From another wheel Q^1 on this same shaft a band R^1 extends to a pulley S^1 on the shaft, of which there is a wheel T^u that drives the exhaust fan G^1 by the belt U^u. And from a pulley V^1, on the same line shaft, a belt extends to a wheel W^1, on the shaft of which there is a pulley X^1, from which extends another belt Y^1 to a wheel Z^1 on the shaft A^2, that carries the eccentric
33 T, to give all the reduced motions required for the other parts of the machinery. From a wheel B^2 on this shaft, a belt C^2 extends to a pulley D^2 on the shaft Z that rotates the cone O; and another pulley E^2 drives the wheel F^2 of the feed-roller C by the belt G^2; and on the other end of the axle of this feed-roller there is a pulley H^2, which drives, by a cross-belt I^2, the upper feed-roller C^1. If desired, an alarm can be connected with the feed-roller of the lower apron, to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arbor of the feed-roller C, of the lower feed-apron, by a belt with a wheel K^2, provided with a cam or pin, to lift, at every revolution, the hammer L^2 of a bell M^2, the striking of which shall give requisite indication.

The fibres constituting the bat, formed by the deposit of fur fibres, whether by the machinery herein described, but not claimed herein, or by any equivalent means, such as the Fosket machine, are only held together by the pressure of the surrounding air, induced by exhausting the air from the inside of the previous cone, and before the bat can be removed it must be partially felted, termed "hardened,"

to give it the required consistency to admit of handling. And it will be obvious that this partial felting of the bat connot be performed on the cone by any of the known processes of partial felting, unless the fibres be held to the surface of the cone by some means. The mode of working this branch of the combined process, which was adopted by the said Wells, is as follows, viz: so soon as a bat is formed, the attendant takes from a kettle of hot water a piece of cloth (felt cloth being best) rolled upon a roller, and applies one end of it to the surface of the bat, and as the cone rotates the cloth winds from the roller on to the bat on the cone. This only covers the straight or conical part of the bat, but not the rounded tip, which, being generally the thinnest and most delicate, it is important to harden. This part of the bat is covered by another piece of cloth, and then a strong metallic cone K^1 (figure 6) is put over the whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them, whilst the whole is immersed in hot water, to harden or partially felt the bat by the circulation of the hot water through the apertures of the two cones and through the bat. As the perforated cone O is better when made very thin, the presure of the water, when drawing it out of the kettle after the bat has been hardened tends to collapse it; and, therefore, to prevent this, another perforated metallic cone T^{III} (figure 7) may be put inside, (before the whole is immersed in hot water,) to sustain the pressure in drawing the whole out of the kettle. The relative situation of the three metallic cones, the bat, and the covering of felt cloth, is represented on a large scale at figure 8, which is a verticle section through the whole. The inner cone may be dispensed with if the cone O be made of sufficient strength. By this mode of application of the second branch of the said process the pressure of the surrounding air for holding the fibres to the surface of the pervious cone can be suspended so soon as the bat is covered, so that the whole can be removed from the exhausting apparatus, to be hardened while another bat is being formed on another cone; and although the mode of application of the second branch of the said compound processes above described is deemed the best, I do not, however, wish to be understood as limiting the claim of invention to such mode of application, as the partial felting of the bat on the pervious cone may be effected by other and equivalent modes of felting, so long as the fibres constituting the bat are held to the surface of the cone by suitable pressure during the partial felting or hardening.

34

What I claim as the invention of the said Henry A. Wells is the combined process of forming fur hat-bodies, by depositing fur fibres to a suitable thickness on the surface of a pervious former of the required shape, and holding them thereon by the pressure of the surrounding air, as they are deposited, and then hardening or partially felting the bat so formed; and while it is held by suitable pressure on to the surface of the former, to give it the required consistency to admit of removing it therefrom in a suitable condition for the after process of sizing by felting, as set forth.

H. A. BURR.

Witnesses:
ANDREW DE LACY.
GEO. A. STREET.

35 *Wells's patent for machinery.*

SCHEDULE D.

Reissue No. 1087.

The United States of America to all to whom these letters patent shall come:

Whereas Henry A. Burr of New York, N. Y., assignee through mesne assignments of Henry A. Wells, deceased, has alleged that said Henry A. Wells did, in his lifetime, invent a new and useful improvement in machinery for making hat-bodies, (for which letters patent were issued to said Wells, dated April 25th, 1846, the same surrendered and new letters issued to Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, as assignees of said Wells, dated September 30th, 1856, the same extended for seven years from and after April 25th, 1860, which last letters having been surrendered by said Burr, the same have been canceled and new letters ordered to issue to him on an amended specification,) which he stated had not been known or used before his application, had made oath that he was a citizen of the United States; that he did verily believe that he was the original and first inventor or discoverer of the said improvement, and that the same had not, to the best of his knowledge and belief, been previously known or used; said Burr having paid into the treasury of the United States the sum of fifteen dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Henry A. Burr, his heirs, administrators, or assigns, for the term of twenty-one years from the twenty-fifth day of April, one thousand eight hundred and forty-six, the full and exclusive right and liberty of making, constructing, using and vending to others to be used, the said
36 improvement, a description whereof is given in the words of the said Henry A. Burr, in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

[L. S.] Given under my hand at the city of Washington, this fourth day of December, in the year of our Lord one thousand eight hundred and sixty, and of the independence of the United States of America the eighty-fifth.

JACOB THOMPSON,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

PHILIP F. THOMAS,
Commissioner of Patents.

Wells's specification for patent for machinery.

THE SCHEDULE REFERRED TO IN THESE LETTERS PATENT, AND MAKING PART OF THE SAME.

To all whom it may concern:

Be it known that Henry A. Wells, late of the city, county, and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in machinery for making hat-bodies of fur, for which said improvements letters patent of the United States were granted to said Wells, bearing date the 25th day of April, 1846; and that the following is a full, clear, and exact description of the principle and character which distinguishes the said invention from all other things before known; and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings making part of this description, in which

Figure 1 is a plan of the machine;

Figure 2, a longitudinal vertical section; and

Figure 3, a longitudinal elevation.

37 The other figures will be described in their appropriate places.

The same letters indicate like parts in all the figures.

It has long been essayed to make hat-bodies by throwing the fibres of fur, wool, etc., from a carding engine into the open air over a perforated cone, exhausted by a fan below, to draw down and hold the fibres thereon by the currents of air that rush from all directions towards and through the apertures of the cone, and thus to form a bat of fibres, to be afterwards held together by immersion in some glutinous composition; but, from various causes, all these attempts have failed, and a patent was granted to William Fosket, bearing date the 23d day of January, 1846, for a machine in which the fibres to be formed into a hat-body are drawn by suction through a tube into the lower part of a chamber surrounding a pervious cone or former, the inside of which is connected with an exhausting fan to exhaust the air from the inside thereof, to induce currents in the surrounding air to rush in all directions towards the outer surface of the pervious former, and through the apertures thereof, and thus to carry the fibres from the lower part of the surrounding chamber towards, and deposit, and hold them on the outer surface of the said former.

Hat-bodies are required to be made thick at and near the rim, and thin along the crown and tip, that the required strength may be given, where it is required, without making the hat too heavy, and at too great a cost of material. The disposition of the fur can be obtained by the skill and judgment of the workmen by the hand process, known under the name of "bowing," but cannot by the plans above referred to, for the reason that the fibres are only controlled by the currents induced through the apertures of the cone, or other former, by exhausting the air from the inside of it, instead of being properly directed for distribution on to the surface of the cone or other former. When the fibres are not properly directed, but are drawn to the surface by the action of the exhaust, the force thus induced gradually

decreases as the apertures on the cone are closed up by the accumulation of the fur deposited on the outer surface thereof, and, in consequence, the required distribution cannot be obtained.

38 The mode of operation of the said invention of the said Henry A. Wells is such, that the fur fibres are directed and controlled so as to travel from the picking and disintegrating brush towards the surface of the pervious cone or other former, that they may be deposited thereon to the thickness required to make a bat of uniform thickness all around, and of the required varying thickness from brim to tip; and this mode of operation results from combining with a rotary picking and disintegrating brush, and a pervious cone or equivalent former, connected with an exhausting apparatus, suitable means for directing and controlling the fur-bearing currents.

The said mode of operation, invented by the said Henry A. Wells, is embodied in the following description of the mode of application, reference being had to the accompanying drawings, in which A is a frame properly adapted to the operative parts of the machine, and B the lower feed-apron, on which the stock or fur is spread, by the attendant, in separate parcels, each sufficient for the formation of a hat, according to its intended weight. This apron, or endless belt of cloth, or other suitable material, passes around a roller C and a lip D; the former at the back of the machine, with its bearings in sliding boxes, governed by set-screws E E, for the purpose of tightening the apron, and the latter near to the rotating brush F, and so formed as to present a slightly rounded edge for the apron to pass over, where it presents the fur to the action of the picker. Instead of this slightly rounded edge, a small metallic roller may be substituted; but when this is done, the roller should be supported at different points between its end journals, by letting it run in a circular groove in the lip, as represented in section at figure 4, where G indicates this roller. The fur, as it is carried along towards the lip D, is gradually compressed by the upper apron V^1, which passes around a feed-roller C^1 and lip D^1, in a manner similar to the under feed-apron. The roller C^1 runs in a frame I, of which the lip D^1 forms part, hung on journals that rest in standards J, so that the lip D^1 can be made to press on to the fur between it and the under lip D, and thus gripe the fibres and present them to the effective action of the picker F. The under plane of the upper apron B^1 is inclined to the upper plane of the lower

39 one B, the more effectually to present the fibres in the proper manner to the picker. The roller C^1 of the upper apron runs in sliding boxes, governed by set-screws E^1 E^1, and is placed forward of the journals of the frame, so that the tension of the belt I^2, which communicates motion from the lower roller C to the upper one C^1, may press the upper lip D^1 on the under lip D; but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure under similar circumstances.

The fibres, as they pass from the feed-aprons, are acted upon by a brush, or picking or disintegrating brush F, that rotates with great velocity, and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed if desired. As the fibres are first presented they are brushed

and properly laid by the downward action of the brush, as indicated by the arrow, and when liberated are carried down the curved surface L of a chamber or tunnel M, and at the lower edge of this they meet a current of air that enters a narrow aperture N, near the bottom of the chamber, and extending the whole length of the picking or disintegrating brush, which being induced by the rotation of the picking or disintegrating brush and the partial vacuum in the perforated cone O, aids in carrying and giving direction to the fur-bearing current towards the surface of the perforated cone O. This chamber extends over and under the picking or disintegrating brush and the forward part of the lips, and turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush. Its bottom rests on a set-screw P, to regulate the delivery end of the chamber relatively to the cone. Its forward end, in addition to this, is provided with a hinged deflector Q, regulated by a cam, lever, or other suitable means to regulate the delivery of the fibres at and near the base of the cone. The top R of this trunk is gradually elevated, and its sides are contracted to make the delivery aperture nearly of the form of the cone, but narrower and higher. And its upper part is provided with a deflector S, so curved as to correspond generally with the curve of the tip of the cone. This deflector is hinged to the upper part of the delivery aperture of the chamber, and is connected with an eccentric T by means of a cord U, that passes over a pulley V, and which is attached to a bell-crank U^1 so that each revolution of the eccentric carries the hood up and down to direct the discharge, and distribute the fibres on to the cone, a greater thickness being desirable in the parts of the bat which form the brim than on the tip and crown; and when it is desired still further to diversify the distribution of the fibres, other means can be substituted for the eccentric, and the connection between it and the deflector is formed as represented in section at figure 5, where the cam T acts on the lever T^1, connected by the cord U. The cone O is made in the usual manner, but of thin sheet metal perforated, that being better than wire gauze. Its lower edge fits in a metallic ring W, that runs in an appropriate collar in the upper part of a case X, and its outer periphery is provided with cogs that mesh into the cogs of a pinion Y, concealed in the drawing by the pulley D^2, on a vertical shaft Z, by which a slow rotary motion is given to the cone, as the fibres are thrown on to it, to distribute them equally all around. The case X may be made sufficiently long to receive two rings W, one on each side of the pinion Y, by which both are kept in motion, and it (the case) may be made to swivel on a hollow collar F_1, to which its bottom is fitted, so that when a bat is formed on one cone it may be turned aside by turning the case half a revolution, and another cone put on to the other ring, that another bat may be in the process of forming, whilst the one already formed may be prepared for the hardening process in the manner to be hereafter described.

The case X communicates through the hollow collar F^1, with an exhausting fan-blower G^1, which consists of a vertical arbor H^1, with oblique vanes I^1, so that, when rotating with great velocity in the direction of the arrow, the air is exhausted from the case X, and the

inside of the perforated cone O. When one of the cones is removed from one of the rings W, to be taken to the hardening apparatus, the aperture in the ring W must be closed up with a cap-plate W^2, to prevent the passage of air. Any other mode of exhausting the case and cone may be employed, but this is deemed the best.

41 All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying drawings, in which M^1 is a main line shaft overhead, driven by any first mover. From a wheel N^1 on it, a band O^1 extends to a pully P^1, on the shaft of the brush, which should make about two thousand revolutions per minute, more or less. From another wheel Q_1, on this same shaft, a band R^1 extends to a pulley S^1, on the shaft of which there is a wheel T^{11}, that drives the exhaust fan G_1, by the belt U^{11}, and from the pulley V on the same line shaft, a belt extends to a wheel W^1, on the shaft of which there is a pulley X^1, from which extends another belt Y^1 to a wheel Z^1 on the shaft A^2, that carries the eccentric T, to give all the reduced motions required for the other parts of the machinery. From a wheel B^2 on this shaft a belt C^2 extends to a pulley D^2 on the shaft Z, that rotates the cone O, and another pulley E^2 drives the wheel F^2 of the feed roller C, by the belt G^2, and on the other end of the axle of this feed-roller there is a pulley W^2, which drives, by a cross-belt, I^2, the upper feed-roller C^1. If desired, an alarm can be connected with the feed-roller of the lower apron, to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arbor of the feed-roller C of the lower feed-apron by a belt, with a wheel K^2 provided with a cam or pin, to lift, at every revolution, the hammer L^2 of a bell M^2, the striking of which shall give requisite indication. It will be obvious, from the foregoing, that the upper deflector S may be operated or adjusted by hand instead of machinery, thus substituting the attention, skill, and cost of an operative for the positive regularity and cheapness of mechanical movements. The preparation of the formed bat for hardening is effected by covering it with pieces of felt or fulled cloth, just taken from hot water, and this is done in the following manner, namely: The attendant takes from a kettle of hot water a piece of felt cloth, rolled upon a roller, and applies one end of it to the surface of the bat, and as the cone rotates the felt cloth winds from the roller on to the bat on the cone. Another piece of felt cloth is put on the top, and then a strong perforated metallic cone K^1, (see figure 6,) is put over the

42 whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them whilst it is "immersed" in hot water to harden. As the perforated cone O is better when made very thin, the pressure of the water when drawing it out of the kettle, after the bat has been hardened, tends to and would collapse it, and therefore, to prevent this, another perforated metallic cone T^{111} (see figure 7,) is put inside, before the whole is immersed in hot water, to sustain the pressure in drawing the whole out of the hardening table. The relative situation of the three cones, the bat, and the covering of felt cloth, preparatory to the hardening process, is represented on an enlarged scale at figure 8, which is a vertical section through the

whole. The inner sustaining cone may be dispensed with, if desired, by making the cone O of greater thickness and strength.

Having thus described the mode of application of the said invention of the said Henry A. Wells, as the same was successfully reduced to practice by him, I do not wish to be understood as limiting the claim of my invention to such mode of application, as other modes may be devised having the same mode of operation or principle, and only differing from it in form or in the substitution of equivalent means.

Nor do I wish to be understood as making claim therein to the combined process of forming and of hardening hat-bodies on pervious cones or other analogous formers, preparatory to taking them off in a suitable condition for the after-process of sizing by felting, as this is the subject of another patent.

What I claim as the invention of the said Henry A. Wells, in machinery for forming bats of fur fibres, in the manufacture of fur hat-bodies, is the mode of operation substantially as herein described, of forming bats of fur fibres of the required varying thickness from brim to tip, which mode of operation results from the combination of the rotating picking mechanism, or the equivalent thereof, the pervious former and its exhausting mechanism, or the equivalent thereof, and the means for directing the fur-bearing current, or the equivalent thereof, as set forth.

I also claim the combination of the rotating picking mechanism, or the equivalent thereof, the pervious former, with its exhausting mechanism, and the lower deflector, substantially as described, to regulate the deposit of the fur fibres on the lower part of the former, as described.

43 I also claim the combination of the rotating picking mechanism, or the equivalent thereof, the pervious former, with its exhausting mechanism, and the upper deflector, substantially as described, to regulate the deposit of the fur fibres on the tip of the pervious former, as set forth.

And I finally claim the combination of the rotating picking mechanism, the pervious former with its exhausting mechanism, and the means described, or the equivalent thereof, for inducing a current of air, to aid in carrying and giving direction to the fur, and insuring its proper deposit on the surface of the pervious former as required, as set forth.

H. A. BURR.

Witnesses:
ANDREW DE LACY.
GEO. H. STREET.

45 *Answer to bill.*

In the circuit court of the United States in and for the district of New Jersey. In equity.

The joint and several answers of Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, defendants, to the bill of complaint of Henry A. Burr, complainant.

These defendants, now and at all time hereafter, saving and reserving to themselves, and each of them, all manner of benefit and advan-

tage of exception that can, or may be had, or taken, to the many errors, insufficiencies, and imperfections in the said bill of complaint contained, for answer thereto, or to so much thereof as they are advised it is material and necessary for them to make answer unto, answering, say that so far as they have any knowledge or information, they do not believe, and therefore deny, that Henry A. Wells, mentioned in the complainant's bill of complaint, either before the 25th day of April, 1846, or at any other time, invented the new and useful improvement in the machinery and process of making hat-bodies, or that he ever was the original and first inventor of any such improvement. And these defendants, further answering, say that they are informed, and believe, and therefore admit, that letters patent for said alleged invention were granted Henry A Wells, on the 25th day of April, 1846, as in said bill is alleged.

And these defendants, further answering, say that they are not informed, save by said bill of complaint, and therefore can not say, whether or not Charles St. John, A. H. Wright, James M. Riblet, and complainant were, on or about the 30th day of September, 1856, the owners of said patent, and leave the complainant, if material, to make due proof thereof, as he may be advised.

And these defendants, further answering, on information and belief, deny that in the original patent granted to said Wells there were errors, by reason of which the patent was inoperative to secure the full benefit and advantages of all that said Wells invented or
46 intended to patent, and of all he described in his said patent as his invention, or that there were any such errors which arose from inadvertence, accident, or mistake, or that said patent was surrendered, or a reissue sought for any such cause.

And these defendants, further answering, say that they are informed, and believe, and therefore admit, that the said Charles St. John, A. H. Wright, James M. Riblet, and complainant did, on the 30th day of September, 1856, surrender the said original letters patent, and obtain a reissue of said letters patent, which said reissued patent is marked reissue No. 400, and is alleged in said bill of complaint; but these defendants insist that said surrender and reissue was null and void.

And these defendants, further answering, say that they are informed, and believe, and therefore admit, that said Henry A. Wells departed this life on or about the 27th day of March, 1851, intestate; that his widow, Eliza Wells, as his administratrix, did make application to the Commissioner of Patents for an extension of said letters patent, and that on the 17th day of April, 1860, said letters patent were extended for the further term of seven years, as is set forth in the bill of complaint. And these defendants, further answering, say that *that* they do not know, and are not informed, save by the complainant's bill of complaint, and can not answer on information, or belief, or otherwise, whether or not the said Eliza Wells, administratrix aforesaid, did, on or about the 23d day of April, 1860, by an instrument of writing, duly executed, sell, assign, and set over to the complainant, all her interest as administratrix in the said extended term of said letters patent, or whether or not Eliza Brewer and her husband

Merwin R. Brewer, and Henry R. Wells, Charles W. Wells, and Caroline W. Wells, as the children and heirs-at-law of said Henry A. Wells, did, by an instrument of writing duly executed, and dated 23d day of April, 1860, confirm and ratify the above-mentioned assignment of Eliza Wells, administratrix as aforesaid, as in said bill is alleged, and leave complainant to make such proof as he shall be advised.

And these defendants, further answering, say that they admit that two reissued letters patent were granted and issued to said
47 complainant, marked Reissue No. 1086 and Reissue No. 1087, respectively, and dated 4th of December, 1860, as stated in said bill, but they deny that they, or either of them, were for the same invention or inventions as was said original patent, or was described therein; on the contrary they believe, and aver that said reissued patents, and each of them, are and is for other and different inventions, and covers inventions and things not made by said Wells, or known to said Wells, and that the object and purpose of the aforesaid surrender and reissues was, to include in, and cover by the reissues more than said Wells was the inventor of, and more than he described or claimed as his invention, and things which had been invented by others, and to render the reissue equivocal, and that the same was fraudulent, and that said reissues are equivocal, and null, and void; and these defendants insist that each of said letters patent are too broad, and claim and cover more than said Wells was the first inventor of, and subject-matters and things which are not patentable; and that they are not for the same invention as was the original patent, and they do not know that the copies annexed to said bill are correct copies of said reissued patents, and pray the production of the patents.

And these defendants, further answering, deny that the said invention and improvements, secured or intended to be secured by be said original letters patent, and by the said new and reissued letters patent first hereinbefore mentioned, and by the said new and reissued letters patent last hereinbefore mentioned, were the same identical invention and improvements as were originally and first invented by said Henry A. Wells, and described in the specification of the same, annexed as a schedule to the said original letters patent, but that, on the contrary, these defendants insist that the said reissues are for an entirely different invention from that invented by said Henry A. Wells, and described and claimed in his original letters patent, and that by reason thereof, the said reissued letters patent are null and void.

These defendants, further answering, say that they are now using two machines constructed in accordance with the description and claim of said Henry A. Wells's patent of 25th of April, 1846, and are manufacturing hat-bodies in connection with said machines, in the manner described in the letters patent last named, and that
48 they claim the right so to do, under and by virtue of the agreement annexed to the bill of complaint, and dated 7th of November, 1848, and the agreement dated 10th of December, 1859, also annexed to said bill of complaint. And these defendants deny that by any act of theirs the said agreements, so far as they are con-

cerned, are annulled; but, on the contrary, insist that they are still in force and effect; and these defendants deny that the chief consideration of the said complainant and his associates in making said agreements was anything else than what is mentioned in said agreements themselves.

These defendants, further answering, say that since the making of said agreements they have made and used two machines constructed in accordance with said Henry A. Wells's patent aforesaid, under said license, and at no time have they had more than two such machines in use; that said machines have been repaired and reconstructed whenever it became necessary, and in one or two instances when one of the machines became worthless, another of the same kind was substituted. In some cases the machines so substituted for the worn-out and defective machines were obtained from the complainant or his associates; and in one or two instances, the complainant having refused or neglected to furnish the machines and keep them in order, the defendants did it themselves.

These defendants, further answering, deny that any machine constructed according to the plan described in said Henry A. Wells's patent of 25th of April, 1846, was ever used by them for the manufacturing of hat-bodies for other persons, or for sale in an unfinished state, but, on the contrary, insist that said machines were used in all respects in strict accordance with the terms of said agreement; and that these defendants have at all times heretofore, and in all respects, complied with the terms of said agreement.

And these defendants, further answering, say that (with the exception of the construction and use of the two machines used by them in accordance with said Henry A. Wells's patent of 25th April, 1846, from time to time, since the making of the aforesaid agreements down to the present time) they have not made, constructed, or used
49 any machines according to the letters patent of the complainant, or containing the invention of said Henry A. Wells, as charged in the bill of complaint, but they admit that they have used machines for making hat-bodies, constructed and operating in a manner and upon a principle entirely different from the invention of Henry A. Wells, and from the letters patent of complainant, and they insist that they have a full right so to do.

And these defendants, further answering, deny that they are in any way estopped from denying the validity of the reissued letters patent of Henry A. Wells, marked Reissue No. 1086 and Reissue No. 1087, respectively, and set forth in said bill of complaint, and that moreover said defendants, in making said agreements mentioned in said bill of complaint, could not have had knowledge of said reissued letters patent, inasmuch as said reissued letters patent, on which said complainant brings his present bill of complaint, are of a date long posterior to the date of said agreements, and they say that in all respects they have kept and performed all agreements which they have made with said complainant, and are advised and insist that they are in no way estopped or prejudiced in their right of defence in this suit, from or by virtue of their having accepted or taken such licenses.

And these defendants, further answering, say that they are informed

and believe, and therefore admit, that a bill was filed against Mead and others, in the United States circuit court for the eastern district of Pennsylvania, and the court ordered issues to be tried by a jury, and they came on to be tried as stated in complainant's bill, and that the finding of the jury sustained the validity of the patent in whole or in part, and in convicting the defendants therein of an infringement; but these defendants are informed and believe that said patent was sustained only for the peculiar trunk or guide, with its fixtures in combination, and for the use of hot water to harden the bats while on the cone, and that the infringement found consisted in the use of one or all of these things, and that said patent in said suit was not sustained, as covering what is claimed by the complainant in this suit, and by virtue of the reissued patents on which this suit is brought.

And these defendants, further answering, say that special in-
50 junctions on *ex parte* affidavits they believe were issued in the circuit court of the United States for the district of Massachusetts, at the suit of the said complainant against Christian Raake, and Brown, and Gill, and in the circuit court of the United States for the southern district of New York, against James H. Prentice, and in the circuit of the United States for the district of New Jersey, against Alva B. Taylor and another; but in each and all of these cases the said defendants employed a peculiar trunk or guide, with its fixtures in combination, or employed a movable hood to regulate the deposit, and, with the exception of Alva B. Taylor, they all employed hot water and steam for hardening the body, and that these defendants' machines, in principle and mode of operation, (with the exception of the two Wells's machines hereinbefore mentioned,) are entirely different from those used by the defendants, respectively, in the suits above mentioned.

These defendants, further answering, say that a suit against Alva B. Taylor, conjointly with George E. Cowperthwaite, for the use of the same machine as that for which a special injunction was granted in the United States circuit court for the district of New Jersey, was subsequently instituted in the United States circuit court for the district of Connecticut; and the same having been brought to final hearing on bill, answer, and proof, it was adjudged and decreed that the said machines of the said Alva B. Taylor did not infringe upon complainant's letters patent, and thereupon the complainant and his associates purchased the said machine of George E. Cowperthwaite, and the letters patent of said Cowperthwaite machines, at a large price.

And these defendants, further answering, say that they have not, and do not use or employ any machine, (except the two Wells's machines, hereinbefore mentioned,) or process of manufacture of hat-bodies, since the aforesaid surrender and reissues, in principle, construction, or mode of operation like or substantially like anything invented by said Wells, or included or covered by his said original patent, or described in either of the said reissues thereof, or which is covered by or included in or patented by either of said reissues, when so constructed as not to render them null and void. And that
51 the machines and processes (except the aforesaid two Wells's machines) used by these defendants are entirely independent of,

and distinct and different from anything described or claimed in said original patent as the invention of said Wells, or described as his invention in either of said reissues, under any construction thereof, which would not render them invalid and void.

And these defendants insist, that no construction can be put upon or given to said reissued patents, or either of them, sufficiently broad and comprehensive to cover or include anything which these defendants use or employ in the manufacture of hat-bodies, without at the same time rendering such patent or patents so broad as to cover inventions and things known and used before the said supposed invention of said Wells, or to cover unpatentable subject-matter, and thereby rendering such patents invalid and inoperative.

And these defendants, further answering, deny any and all infringement and violation, and all intention to infringe any of said patent rights stated and charged in said bill of complaint, or any right or privilege belonging to said complainant, and they deny any and all communication and confederacy stated and charged in said bill.

And these defendants, further answering, say that they are advised, and believe, and insist that there has never been any verdict of a jury, or any decision of any court or judge on a hearing on the merits, to the effect of sustaining said reissued letters patent, or either of them, or of sustaining any patents for what said complainant claims under and by virtue of said reissued letters patent; and that, on the contrary, the purport and effect of the proceedings and results of the litigations which have been had thereon, and procured and published from time to time by owners of said patent or an interest therein, and among them by the complainant, are such as to show and prove that these defendants understood and believed that the said supposed invention of said Wells, and all letters patent which had been or could be issued therefor, were limited to what the said original letters patent purport to be for that is, to the peculiar trunk and conductor therein described, be for in comibnation with its movable hood and other parts, and the
52 preparation of the bat by immersion in hot water, and the peculiar double feed-apron in combination with other parts, all as set forth in said original letters patent. And that they have never acknowledged or supposed anything else to be within said patent, or that anything else could be legally or justly put into any reissue thereof, and they say that they have never supposed or acknowledged or believed that the said reissued patents upon which this suit is brought are valid or operative, and believe that said reissues were obtained for the purpose of appearing to cover what said assignees have no right to and to embarrass manufacturers, and to deter the public from using what they have a right to.

And these defendants, further answering, say that at and before the time of the application of the said Henry A. Wells, for letters patent of the United States, as in said bill of complaint is alleged, various machines and processes for the manufacture of hat-bodies had been invented and were known, used, patented, published, described, filed, and exhibited of record, constituting a certain state of the art which was then and has since become and continued to be public property, free and common to be used by these defendants and all

other persons; that numerous machines and processes so described, patented, or known and used anterior to the date of said patent, embraced substantially portions of the machinery and processes mentioned in the specification of said Henry A. Wells, and also of what is patented by said reissued patents, if construed as complainant insists upon having them construed.

And these defendants, further answering, say that in order to inform the court to the state of the art at and prior to the date of said letters patent of said Henry A. Wells, and with a view to a proper understanding thereof, they refer, among other things, to the letters patent of the United States granted to Stephen Hurlbert, June 13, 1831, in which letters patent is described a process of hardening hat-bodies on a perforated conical former, by the use of steam, an outside cover, and a vibratory motion; and, on information and belief, they say that the same was known to and used by said Hurlbert and others near Hartford, Connecticut, prior to the time of the
53 said supposed invention of said Wells; also, to the letters patent of the United States, granted to Thomas Blanchard June 14, 1837, in which letters patent is described a process for forming fur hat-bodies by the employment of a perforated metallic cylinder, and other forms, revolving exhaust and fan-blower, in combination with other parts, as therein described; and as these defendants are informed and believe, the same was known to and used by said Blanchard, now of Boston, Massachusetts, and others in his employment, at Brooklyn, New York, and at Millville, New Jersey, and was known to and used by him and divers other persons long before the time of the said supposed invention of said Wells; also, to the letters patent of the United States granted to the aforesaid Henry A. Wells, in conjunction with James James and Robert W. Peck, September 22d, 1837, in which letters patent the aforesaid Wells described as known and in use, a metallic vacuum cylinder, the employment of a fan or picker for distributing and discharging the fibres of fur, a mode of varying the thickness of deposit on the bat. And the said Henry A. Wells described said parts and processes, and admitted the same to be known and used before, and disclaim the invention of the said parts and processes; and, on information and belief, they say that the same was known to and used by said Wells and the said Peck, of Brooklyn, and James, of Brooklyn, New York, at Brooklyn, and by A. Peck and J. D. Condit, at Millville, New Jersey, now of said Millville, in the State of New Jersey, and in the city of New York and other places, and was known to and used by them and divers other persons long prior to the time of said supposed invention of said Wells.

Also to the letters patent of the United States granted to Henry A. Wells, and James James, and R. W. Peck, September 20th, 1837, for a machine for forming fur webbing into hat-bodies, and hardening the same, in which fur bats were formed upon a conical former, and steam applied thereto while on the cone for hardening; and, on information and belief, they say that the same was known to and used by said Wells and said Peck, of Brooklyn, and said James, of Brooklyn, at Brooklyn, in the State of New York, and by A. Peck and J. D. Condit, at Millville, in the State of New Jersey, and in the

54 city of New York and other places, and was known to and used by them and divers other persons long prior to the time of the said supposed invention of said Wells. Also to the letters patent of the United States granted to Henry A. Wells on the 11th day of September, 1841, and on the 18th day of September, 1841; and, on information and belief, they say the same was known to and used by the said Henry A. Wells, and was known to and used by divers other persons, long prior to the time of said supposed invention of said Wells; and also to the letters patent of the United States granted to Hezekiah J. Miller, dated March 5, 1839, for machines for making fur hat-bodies, in which are exhibited and described a fan for distributing and throwing the fur, a trunk for conducting a current of air, and a perforated cylinder for receiving the fur, and a method for varying or regulating the thickness of the fur; and, on information and belief, they say that the same was known to and used by said Miller, then of Philadelphia, and divers other persons at said Philadelphia, for long prior to the time of the said supposed invention of said Wells. Also to the English letters patent of T. R. Williams, sealed February 14, 1833, and to the publication thereof in *Newton's Journal of Science and the Arts*, volume 10, 3d series, page 73.

Also to the English letters patent of William Ponsford, sealed on the day of , 1839; also to the English letters patent of T. R. Williams, sealed the 20th day of September, 1839, and to the publication thereof in *Newton's London Journal*, vol 18, page 239; also to the English letters patent of T. R. Williams, sealed 7th of April, 1845, and to the publication of the same in the *London Journal*, vol. 29, page 225; also to letters patent of the United States to T. R. Williams, of April 24, 1840, and the records of the Patent Office; and, on information and belief, they say that the said several inventions and improvements exhibited and described in the aforesaid several patents of said Williams, as well as other improvements in machinery and process for making hat-bodies, and substantial and material parts of which are contained in the aforesaid letters patent of said Wells, were known to and used by divers other persons at divers places long prior to the time of the aforesaid supposed invention by said
55 Wells, and that said Wells was acquainted with said Williams, and was at his place when he was employing said improvements, and received a knowledge thereof, and was instructed by said Williams in the art and means of making hat-bodies, including things which said complainant seeks to acquire a monopoly of by said reissued letters patent long before the time of the said supposed invention of the said Wells, and at which time the said Williams, and the men in his employment, instructed said Wells how to make hat-bodies by the use of a revolving perforated exhausted cone, in combination with a picker, with an endless feeding-apron, and how to harden the bat while remaining on the cone in which it was formed, by covering the same with an outer cone-case, and then removing the whole from the exhaust and immersing it into a hot or warm liquid; and these defendants are informed that all the substantial and material parts and things claimed by said Wells as his invention he received a knowl-

edge of from said Williams, and from his and others' uses of said Williams's invention prior to said Wells making any invention thereof, and which things so communicated to said Wells, the complainant now claims the right to monopolize to himself by virtue of the said reissued letters patent, and they are informed that the said complainant has stated that he did not believe that said Wells was the inventor of any important part of the improvements patented by him.

Also to the letters patent of the United States granted to William Fosket, dated January 23, 1846, and reissued , and to his caveat previously filed in the Patent Office, and to the records and files of his application for said caveat and patent, and for the reissue thereof now in the Patent Office, and to the other well-known and familiar publications and books of science and the arts, in which various machines and processes for making fur and forming fur and wool bats, and for hardening fur and wool, and for felting fur and wool hat-bodies, are set forth.

And these defendants, further answering, say that long prior to the said supposed invention of said Wells, the invention of a combination of an endless apron to feed the fur to a picker; a picker to
56 disintegrate the fur and throw it into a trunk or conductor towards a revolving perforated exhausted cone; a trunk and conductor to receive the fur, and guide and conduct the fur towards the cone as wafted along by the current of air; a cone standing upon its base and over, and its interior communicating with a box exhausted of air by a blower, to cause the fur to be deposited and held upon the cone; devices of several different kinds for controlling the deposit of fur so as to make the bat thicker or thinner in such parts as required; devices and means for hardening the bat while on the cone on which it was formed, to give it sufficient consistency to remove it therefrom, were all well known, and in public and successful use; and among others the same were known to and used by William Fosket, now of Meriden, Connecticut, and Benjamin L. Steadman, of the town of Meriden, Connecticut, at Ware, and other places in its vicinity, and at Boston, in the State of Massachusetts.

And these defendants, further answering, say that they have not used any machinery or process, or parts thereof, (except the two Wells machines hereinbefore mentioned,) which is described or referred to in either of the said reissued patents, except such common parts and things as were well known and public property long prior to the time of the said supposed invention of said Wells, and that they have not employed any machines or process, with the exception of the two Wells machines, which is covered or secured by, or is an infringement upon, either of the aforesaid reissued patents.

And these defendants, further answering, say that they have never infringed or intended to infringe any right of said complainant, and they believe that they have a perfect right to make hat-bodies as they have been doing, and are fully able to respond to complainant in any amount of damages which he will ever recover against them for manufacturing hat-bodies.

And these defendants pray a trial by jury of the various issues of

fact formed by this answer, and of those which shall be formed by the filing of the replication thereto.

And they pray the benefit of as much of their answer as goes in bar of the said bill, the same as if such matter had been pleaded thereto; and they humbly submit and insist that under the facts and
57 circumstances above stated, the said complainant has no right to a writ of injunction as moved for in said bill, and no further answers to said bill than are herein given; and they pray to be hence dismissed with their reasonable costs and charges in this behalf, most wrongfully sustained.

PETER S. DURYEE.
HENRY H. JAQUES.
HENRY W. DURYEE.
COURTLANDT PARKER,
Solicitor and of Counsel with Defendants

UNITED STATES,
Eastern District of Pennsylvania, ss:

Before me, the subscriber, this 26th day of June, 1861, personally appeared Henry H. Jaques, one of the within named defendants, and being duly sworn, doth depose and say that he has read the foregoing answer by him subscribed, and that the matters and things therein contained are true of his own knowledge, except so far as they are stated to be upon information and belief, and that as to these he verily believes them to be true.

J. COOKE LONGSTRETH,
U. S. Commissioner.

UNITED STATES OF AMERICA,
District of New Jersey, ss:

On this 29th day of June, 1861, before me came Peter S. Duryee and Henry W. Duryee, the defendants in the foregoing answer, and by whom the same is subscribed, and being by me severally duly sworn according to law, depose and say that they have read the foregoing answer and know the contents thereof, and that the same is true of their own knowledge, except the matter and things which are therein stated to be upon their information, and that as to these matters they believe them to be true.

PETER S. DURYEE.
HENRY W. DURYEE.

Sworn and subscribed before me, at Newark, the day and year above written.

S. S. MORRIS,
U. S. Commissioner for New Jersey district, in 3d circuit.

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59 U. S. circuit court, district of New Jersey.

HENRY A. BURR
vs.
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE.

The replication of Henry A. Burr, complainant, to the answer of the defendants.

This replicant, saving and reserving to himself, now and at all times hereafter, all and all manner of benefit and advantage of exception which may be had or taken to the manifold insufficiences of the said answer, for replication thereunto says that he will aver, maintain, and prove his bill of complaint to be true, certain, and sufficient in the law to be answered unto; and that the said answer of the said defendants is uncertain, untrue, and insufficient to be replied unto by this repliant, without this, that any other matter or thing whatsoever, in the said answer contained, material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed and avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to aver, maintain, and prove, as this honorable court shall direct, and humbly prays as in and by his said bill he has already prayed.

J. P. BRADLEY,
Solicitor and of Counsel for Complainant.

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61 *Bill on A. B. Taylor's patent, owned by H. A. Burr.*

Circuit court of the United States for the district of New Jersey.—In equity.

To the judges of the circuit court of the United States for the district of New Jersey:

Henry A. Burr, of the city, county, and State of New York, a citizen of the said State of New York, brings this, his bill of complaint, against Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, all of the city of Newark, in county of Essex, and State of New Jersey.

And thereupon your orator, humbly complaining, shows to your honors that heretofore, and before the eighteenth day of March, in the year one thousand eight hundred and fifty-six, Alva B. Taylor, of the said city of New York, a citizen of the said State of New York, invented a certain new and useful improvement in machinery for making hat-bodies, whereof he was the original and first inventor, and which had not been known or used by others before his said invention of the same, and had not been in public use for more than two years before his application for letters patent therefor, nor had the same been on sale with his consent or allowance, as such inventor, prior to his said ap-

plication for letters patent therefor, as hereinafter mentioned; and that being such inventor as aforesaid, and desirous to obtain an exclusive property in the said invention, he afterwards made application in writing to the Commissioner of Patents of the United States for such letters patent, expressing such desire as aforesaid, pursuant to the acts of the Congress of the United States, in such case made and provided, and complied, in all other respects, with the requirements of the said acts; and that letters patent were thereupon issued under the seal of the Patent Office of the United States, signed by the Secretary of the Interior, and countersigned by the said Commis-
62 sioner, in due form of law, bearing date the day and year aforesaid, whereby there were granted to him, his heirs, administrators, or assigns, for the term of fourteen years from the date thereof, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement.

And your orator further shows to your honors that through divers mesne assignments and transfers of the said letters patent he afterwards, and on or about the thirty-first day of October, in the year one thousand eight hundred and fifty-nine, became, and was, and still is, the owner of the same, and of the right and liberty of and in the said invention and improvements thereby secured, or intended to be secured; that in the original letters patent, so issued to the said Alva B. Taylor as aforesaid, errors, in the specification of the said invention and improvements, were incorporated, by reason whereof the said letters patent were inoperative to secure to the owner thereof the full benefits and advantages of the said invention, which said errors arose from inadvertency, accident, or mistake, and without any fraudulent or deceptive intention on the part of the said Alva B. Taylor, and that therefore your orator, being such owner of the said letters patent, and the right and liberty of and in the said invention and improvement secured, or intended to be secured thereby as aforesaid, surrendered the said letters patent to the said Commissioner of Patents, and prayed a reissue of the same, upon an amended specification of the said invention and improvement; that thereupon such proceedings were had, that the said letters patent were canceled, and new and other letters patent were issued under the seal of the said Patent Office, signed by the Secretary of the Interior, and countersigned by the said Commissioner, in due form of law, bearing date on the twenty-first day of August, in the year one thousand eight hundred and sixty, upon the said amended specification, for the same invention and improvement, a description whereof is given in the words of the said Alva B. Taylor, in the schedule thereto annexed, and the drawings accompanying the same, made a part thereof, pursuant to the acts of Congress of the United States, in such case made and provided,
as by reference to the said reissued letters patent now in the
63 possession of your orator, and ready to be produced as your honors may direct, or to a true copy of the same, hereto annexed, as Schedule A, and which he prays may be taken as a part of this bill of complaint, will more fully and at large appear.

And your orator further shows to your honors that the said Alva B. Taylor, after the issuing and delivery of the said original letters

patent as aforesaid, put the said invention into use, and that your orator is now the exclusive owner and possessor of the same.

And your orator further shows to your honors that the said defendants, before and ever since the said twenty-first day of August, in the year one thousand eight hundred and sixty, have been, and now are, using at their factory in the said city of Newark, and within the jurisdiction of this court, in making and forming hat-bodies, divers, to wit: three machines, substantially similar to and embodying the said invention and improvement, described and specified in and by the said reissued letters patent, and the schedule and drawings accompanying the same, made part thereof, and secured thereby, in violation and infringement of the said letters patent, and the full and exclusive right and liberty of and in the said invention and improvement secured thereby, and that they are now making and constructing, or causing to be made and constructed, divers, to wit: fifteen machines, substantially similar to and embodying the said invention and improvement, so secured as aforesaid, and threaten and intend to use the same, when so made and constructed, at their said factory, in the said city of Newark, and elsewhere, in violation and infringement of the said letters patent, and the said right and liberty of and in the said invention and improvement, contrary to equity and good conscience, and to the manifest wrong and injury of your orator in the premises, and that your orator has requested the said defendants to desist from such violation and infringement, but in vain.

In consideration whereof, and forasmuch as your orator can have adequate relief only in this court, where matters of this sort are properly cognizable and relievable, and to the end therefor that the said defendants may, upon their several and respective corporal
64 oath, and to the best of their knowledge, information, and belief, respectively, direct and perfect answer make to all the matters and things hereinbefore set forth, and that as fully and particularly as if the same were here again repeated, and they particularly interrogated thereto, and that they may be enjoined and restrained by a writ of injunction, issued out of and under the seal of this court, from making, constructing, or causing to be made or constructed, using, or vending to others to be used, any machine or machines, such as they are now using, as hereinbefore set forth, or such as are substantially similar to or embody the said invention and improvement, so secured by the said letters patent, as aforesaid, and so assigned to and owned by your orator as aforesaid, and that they may be decreed to account for and pay over to your orator the gains and profits by them made by the use of the said machines as aforesaid since the said twenty-first day of August, in the year one thousand eight hundred and sixty; and that your orator may have such other and further relief as may be consistent with equity and good conscience.

May it please your honors, the premises considered, to grant to your orator, not only a writ of injunction, issuing out of and under the seal of this court, enjoining and restraining the said defendants from making, constructing, or causing to be made or constructed, using, or vending to others to be used, any machine or machines such as they are now using as aforesaid, or such as are substantially similar to or

embody the said invention and improvement of the said Alva B. Taylor, so secured as aforesaid, but also a writ of subpœna, issuing out of and under the seal of this court, commanding them to appear at a certain time and place in this court to answer the premises, and to stand to and abide such orders and decrees herein as may be consistent with equity and justice.

And your orator, as in duty bound, will ever pray, etc.

JOSEPH P. BRADLEY,
Solicitor for and of Counsel with Complainant.

65 UNITED STATES OF AMERICA,
Southern District of New York, ss:

Henry A. Burr, the complainant in the foregoing bill of complaint named, being duly sworn, says that the matters and things set forth in the said bill, so far as they relate to his own acts and deeds, are true, and so far as they relate to the acts and deeds of any other person or persons he believes them to be true.

H. A. BURR.

Sworn and subscribed before me this 19th day of November, 1860.

R. E. STILLWELL,
U. S. Commissioner.

66 Reissue No. 1030.

The United States of America to all to whom these letters patent shall come:

Whereas Henry A. Burr, of New York, N. Y., assignee through mesne assignments of Alva B. Taylor, of New York, aforesaid, has alleged that said Alva B. Taylor did invent a new and useful improvement in machinery for making hat-bodies, (for which letters patent were issued to said Taylor, dated March 18th, 1856, which letters having been surrendered by said assignee, the same have been canceled, and new letters ordered to issue to him on an amended specification,) which he stated had not been known or used before his application, had made oath that he was a citizen of the United States; that he did verily believe that he was the original and first inventor or discoverer of the said improvement; and that the same had not, to the best of his knowledge and belief, been previously known or used; said assignee having paid into the treasury of the United States the sum of fifteen dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Henry A. Burr, his heirs, administrators, or assigns, for the term of fourteen years from the eighteenth day of March, one thousand eight hundred and fifty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the

said Henry A. Burr in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

67 Given under my hand, at the city of Washington, this twenty-first day of August, in the year of our Lord one [L. S.] thousand eight hundred and sixty, and of the independence of the United States of America the eighty-fifth.

JACOB THOMPSON,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

PHILIP F. THOMAS,
Commissioner of Patents.

THE SCHEDULE REFERRED TO IN THESE LETTERS PATENT, AND MAKING PART OF THE SAME.

To all whom it may concern:

Be it known that I, Alva B. Taylor, of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful improvements in the machinery and process of manufacturing hat-bodies, and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which

Fig. 1 represents a side elevation of my improved hat-body machinery;

Fig. 2 is an end elevation of the same;

Fig. 3 is a vertical section thereof;

Fig. 4 is a plan of the fan-case and draught box, certain portions being removed to show the interior arrangement of the parts; and

Fig. 5. is a plan of the scalloped-edged wheel and reciprocating-bar. Various machines have been constructed for manufacturing hat-bodies, which operate upon the general plan of first disseminating the fur, or other stock, in a flocculent state in the air, and directing it upon the surface of a perforated conical former, where it is collected, and there held by the pressure of the surrounding air, induced by exhausting the air from within the cone. When flocculent fur has been collected upon a perforated cone, in the form of a bat, it is ne-

68 cessary to harden it, in order to permit it to be handled, and fit it for the subsequent processes. As the flocculent fibres in such methods of forming hat-bodies are only held on the pervious cone by the pressure of the surrounding air, it becomes necessary to cause the fibres to interlock, technically termed "hardening," before the bat can be safely removed from the pervious cone for the after process of sizing by felting. And it will be obvious that the process of "hardening" must either be performed while the pressure of the surrounding air is continued on the bat to hold the fibres together, or it must be enveloped by some means before the pressure of the surrounding air is suspended; and in such case, the means employed for holding the fibres together on the cone must be such as will admit of the application of some suitable mode of hardening the bat.

My said invention, which relates to the hardening of the bat on the pervious cone on which it is formed, and while the fibres constituting the bat are held to the surface of the cone by the pressure of the surrounding air, consists in combining with a perforated cone, on which the bat of the fibres are held by the pressure of the surrounding air, a vibrating concave surface, held by pressure, so as to act on the convex surface of the bat as it is vibrated, by means of which combination a large segment of the bat, along its entire length, is acted upon at once by the concave surface, while, by the rotation, every part of the circumference is brought, in succession, under the hardening operation.

And my said invention also consists in facilitating the removal of the bat from the pervious cone, by so combining the pervious cone with the blower, or any equivalent therefor, a blast of air can be forced into the cone, and outward against the inside of the bat.

In the accompanying drawings (*A*) is the frame of the picker, upon which the picking-cylinder and feed-motion are mounted, and to which the shafts are secured, by means of which motion is imparted to various parts of the machine. The upper portion (*a*) of this picker-frame is made separate from the lower, and is attached to the latter by hinges or pivots, so that the end of the upper portion of the frame at which the picking-cylinder (*B*) is situated can be raised or de-
69 pressed to adjust the position of the picking-cylinder to perforated cones of different dimensions. This adjustment of the upper portion of the picker-frame is effected by turning a screw (*b*) which passes through a nut which is made fast to a cross-bar (*c*) of the lower portion of the picker-frame, and bears against a cross-bar (c^1) that connects together the sides of the upper portion of the picker-frame. The upper portion of the picker-frame is steadied and guided, as it is raised or depressed, by guide-pins, which project downwards from the upper cross-bar (c^1) through corresponding holes in the lower cross-bar (*c*.) The feed-motion consists of an endless band or apron (*C*) which runs upon two rollers (*d* d^1) situated near the opposite extremities of the upper portion (*a*) of the picker-frame. One of these rollers (*d*) has a pulley-wheel (*D*) secured to its axle, to receive a belt, by which a rotary motion is imparted to the roller from the main shaft (*E*) at the lower part of the frame. The feed-apron conveys the stock to a pair of feed-rollers (*e e*) which are situated immediately in front of the picking-cylinder (*B*.) Motion is imparted to the lower of these feed-rollers from the shaft of the feed-apron roller (*d*) by means of a belt which encircles a belt-pulley secured to the shaft, and a corresponding one upon the axle of a feed-roller. The upper roller is driven from the lower by means of a pair of pinions, whose teeth engage, and which are secured to the axles of the respective feed-rollers. In order that the feed-rollers may gripe the fur more securely, the upper one should be pressed toward the lower by springs or weights, and the barrels of the two rollers should be slightly fluted.

The picking-cylinder (*B*,) which revolves in close proximity with the feed-rollers, has its barrel studded with teeth, which act upon the fur presented to them by the rollers. It should be driven at a

high speed; and in the machine represented in the accompanying drawings, motion is imparted to it from the counter-chaft (E^1) by means of a belt which encircles a suitable belt-pulley secured to the shaft, and a corresponding belt-pulley upon the shaft of the picking-cylinder. The counter-shaft (E^1) is driven from the main shaft by means of cog-wheels secured to the respective shafts. The picking-cylinder revolves in the direction indicated by the arrow placed
70 beneath it in figure 3, and it is covered with a cap or case (F) which extends its whole length, and acts as a deflecting-plate, to cause the fur, which naturally tends to adhere to the picking-cylinder to pass off from the latter in the direction indicated by the red arrow in figure 1. It also prevents the stock from the feed-apron from passing accidently over the upper feed-roller.

The perforated cone (G) which receives the fur from the picking-cylander forms one of a series of three (G G^1 G^2) which project radially from a pyramidal draught-box, (H.) The draught-box is supported by a fan-case (I,) which is sufficiently large to form a firm base for the draught-box, as well as to contain the fan by which the draught is maintained through the perforations of the cones. The draught-box has a collar-plate (i) at its bottom, which fits loosely upon a corresponding collar on the top of the fan-case (I) beneath the draught-box, in such manner that the draught box, with the cones upon it, can be turned upon its axis, to bring each cone in turn in the proper direction to receive the flocculent fur from the picking-cylinder. In order to hold the draught-box, with the cones upon it stationary, until the proper quantity of fur is collected upon the cone opposite the picker, one of its corners is engaged with a spring-catch (g) which is secured to the top of the fan-case. The circular space within the collar-plates is open, so as to permit a free draught from the interior of the draught-box to the fan-case beneath; a circular opening is also made in each face of the draught-box, behind the base of each perforated cone, so as to permit the draught to be drawn through the cone into the draught-box.

Each perforated cone is made fast by a rim at its base to a ring-plate (f) whose face is sufficiently broad to receive perforated cones of the various sizes used in the manufacture of hat-bodies; and the ring-plate is secured to a short shaft (j) that projects radially outwards from the axis of the draught-box. The inner journal of each of these radiating-shafts is supported in a hub (k) at the centre of the draught-box, and the outer journal of each shaft is supported by a bridge-tree (m) which crosses the opening in the face of the draught-box. The radiating-shafts are fitted with radiating-wheels (J)
71 whose teeth engage with a corresponding beveled wheel (J^1) that is secured to an upright shaft (K) passing through the hub of a draught-box. This upright shaft extends upwards sufficiently to pass through and project a short distance beyond the top of the draught-box; it also extends downwards into the fan-case beneath, where it is fitted with a worm-wheel (l) to which motion is imparted by a worm (l^1) upon a horizontal shaft, (E^2.) The fan (M) by which the draught is maintained is of the screw variety. It is situated at the mouth of a circular opening in the partition (L)

which crosses the fan-case and divides it into two parts, the larger of which communicates by the opening in the collar-plates by the draught-box above, while the smaller communicates with an air-trunk situated beneath the floor of the factory, so that the air drawn from the perforated cones through the draught-box and larger compartment of the fan-case is discharged into the smaller compartment, from which it escapes through the air-trunk. The fan-shaft (E^3) is fitted with a belt-pulley, and is driven from the counter-shaft (E) of the picker-frame by means of a belt which passes over a pulley upon the worm-shaft (E^2) and drives the latter.

The axis of the draught-box is inclined in order that when the draught-box is turned upon the collar plates, the perforated cones may readily pass beneath the picking-cylinder; the draught-box is also set close to the picker-frame, so that the perforated cone upon which the fur from the picker is received is separated by no greater space from the latter than is necessary to permit the perforated cones to pass the picker-frame when the draught-box is turned. The inclination of the axis of the draught requires a corresponding inclination in the upright shaft, (K,) which is sufficient to permit the teeth of the worm-wheel to work freely without requiring them to be skewed.

As has been stated, there are three perforated cones (G G^1 G^2) upon the draught-box; one of these, (G,) figures 1 and 2, is in the proper position to receive the fur delivered by the picking-cylinder, being opposite thereto and extending lengthwise therewith—that portion of the conical surface which is nearest to the picking-cylinder being slightly oblique thereto, as shown in the accompanying drawings.

This position of the cone, with reference to the picker, is at-
72 tained by setting the radiating-shaft (j) at a suitable inclination to the upright shaft (K,) and the draught-box is made of pyramidal form, in order to accommodate its sides to the position of the base of the cone. Of the other two cones, one (G^1) is in a proper position for the hardening of the coating of fur or bat which has collected upon it. This hardening is effected by the combined action of pressure and motion. The pressure is imparted by the surrounding air and by means of a conical cover (G^3) which lies loosely upon the bat, upon which cover a series of weighted rollers (N) rests. A rapid reciprocating movement is imparted to the cover by means of a bar (O) which slides radially to and fro across the top of the draught-box. The outer extremity of this reciprocating-bar is fitted with an arm (n) that projects downwards, and is received in a ring-groove which is formed in a boss (o) secured to the head of the cover. The inner half of the reciprocating-bar has two pins (r r^1) protruding from its upper face, which are acted upon alternately by the scalloped rim of a wheel (P) that is secured to the upper end of the upright shaft (K.) The reciprocating-bar is prevented from turning with the scalloped wheel (P) by a guide-standard (q.) in which the outer end of the reciprocating-bar slides, while its inner extremity is maintained in its proper position by the upright shaft (K,) which passes through a slot in the bar; hence, as the upright shaft and the scalloped wheel upon it revolve, a short and rapid or tremulous reciprocating movement is imparted to the reciprocating-bar (o,) and from it by means of the arm

(*n*) at its outer end to the cover (G^3) that is borne upon the bat by the weight of the rollers (*N.*)

In order that the hardened bat may be easily removed from the perforated cone, a blast of air is forced through the cone on to the interior of the bat. The blast of air is obtained from the fan in the fan-case beneath in the following manner: The interior of the draught-box is divided by three radial partitions (*s s s,*) which extend inwards to the central hub (*k*) into three divisions, one of which corresponds with each perforated cone. That portion of each radial partition which is above the circular opening in the collar-plates (*i.*) and below the central hub (*k,*) is cut away, so as to leave the cylindrical space above the circular opening in the collar-plates unob-
73 structed. A curved partition (*t*) projects upwards into the cylindrical space from the fan-case beneath. This curved partition is so secured by its lower edge to the collar-plate upon the fan-case, and it is of such hight and breadth that it closes the space between two of the radial partitions (*s s,*) and shuts off one division of the draught-box and the perforated cone communicating therewith from the remaining two, so that the draught, passing to the fan-case, can not be drawn through the perforated cone, whose base is adjacent to the curved partition. That portion of the top of the fan-case which is immediately beneath the division of the draught-box from which the draught is shut off, is cut away so as to form a communication between the division of the draught-box and the smaller compartment of the fan-case into which the fan discharges air; hence a portion of the air is forced by the fan into the smaller compartment of the fan-case, and intending to escape therefrom, finds its way upwards into the cone, and passing through the perforations thereof, presses upon the interior of the hat-body, and assists its disengagement from the cone.

The various parts of the machinery thus described are caused to move by imparting a rotary motion to the main shaft (*E*) from the prime mover of the manufactory. When the machine is in operation, the feed-apron, feed-rolls, picking-cylinder, and perforated cones, move in the directions respectively indicated by the arrows in the drawings. A weighed quantity of fur, or other suitable stock, sufficient to form one hat-body, is laid by the attendant upon the feed-apron, and is conveyed by it to the feed-rollers, which present it to the picking-cylinder. The latter, in its rapid revolution, picks the fur, and carries it round with it, until it is deflected by the casing of the picking-cylinder. When the fur leaves the cylinder, it is drawn towards the perforated cone immediately opposite; as this cone slowly revolves, the flocculent fur collects upon it until the charge upon the feed-apron is exhausted; at this point of the operation the attendant stops the feed-apron, upon which he has meanwhile been distributing a second charge, which is separated by a short vacant space from the first one. As soon as the whole of the fur is collected upon the perforated cone, an attendant applies a cover to the bat, and then
74 turns the draught-box one-third round, or he can turn it one-third round, and then apply the cover, the fibres of the bat being held to the surface of the cone by the pressure of the air which

is continued to be induced by exhausting the air from the inside of the cone; this movement brings a second cone in the proper position to receive fur from the picker, while the first one, with the bat and cover upon it, is brought to the hardening apparatus, where the pressure applied by the cover, combined with the tremulous movement imparted to it, induces a rapid felting of the fibres of fur, and the consequent hardening of the bat. This operation proceeds so quickly, that by the time the second cone has received a charge of fur upon it from the picking-cylinder, the bat upon the first one is sufficiently hardened to bear handling without injury. The draught-box is now turned a second third of a revolution, by which movement the third cone is presented to the picking-cylinder, the second passes to the hardening apparatus, and the first, with its hardened bat, is freed from the hardening apparatus, and is in the proper position for the removal of the bat. This operation is effected by shaking the cover by hand, when the pressure of the air within the cone detaches the hardened bat, so that it may readily be withdrawn with the cover, leaving the perforated cone free, and ready to be again presented to the picking-cylinder. After the hardened bat, or hat-body, is removed from the machine, the hardening process may be carried to a greater extent by wrapping the bat in a damp linen cloth, and working it by hand in the same manner that bats are worked in the manufacture of hat-bodies by hand. The dimensions of the cover (G_3,) with respect to the bat, are not important, provided that it may be large enough to pass easily over it, as the object of the cover is not to confine the fur, but to impart pressure and friction to it If the cover be of nearly the same size as the bat, it should be perforated to permit the air to press upon the bat; but if the cover be larger in diameter than the bat, it is not necessary that it should be perforated, as there will be sufficient space for air to pass inside of the cover.

In the manufacture of hats, it is customary to form the top, or tip of the hat-body, thinner than the rest, while those parts which are to form the brim of the hat, and to receive the hat-band, should be thicker than the rest. In order to accomplish this result, the fur must be unequally distributed over the perforated cone, a larger quantity being delivered to those parts where the hat-body is to be the thickest. I effect the requisite distribution of the fur for this purpose by varying the feed to the different portions of the picking-cylinder.

From the foregoing, it will be seen that the outer cover, by reason of the form of the inner surface, is made to act at any one time upon the entire length of the bat, from the base or rim to the centre of the tip, and over a considerable portion of its circumference, so that the triturating action, to effect the hardening, can be applied, with entire safety, to the structure of the bat, while the fibres of which it is composed are held to the surface of the pervious cone by the pressure of the surrounding air.

It will be evident to the skillful mechanic that various changes may be made in the machinery described by me without materially affecting the principle of my invention; and I reserve to myself the right to make such changes as circumstances may require.

What I claim as my invention is, the combination of a vibrating concave surface, substantially as described, with an exhausted pervious cone, on which the bat of flocculent fibres is held by the pressure of the surrounding air, substantially as and for the purpose specified.

And I also claim facilitating the removal of the bat from the pervious cone on which it is formed, by means of a blast of air forced into the cone, substantially as specified.

ALVA B. TAYLOR.

Witnesses:
WM. H. BISHOP.
DANIEL BARNUM.

Whereas letters patent of the United States were issued to me, Alva B. Taylor, of Newark, New Jersey, for an improvement in machinery for making hat-bodies, bearing date the 18th day of March, 1856; and whereas George E. Cowperthwaite, of Danbury, Connecticut, is desirous of acquiring the same, and the invention and improvement thereby secured, or intended to be secured: Now,
76 therefore, these presents witnesseth that for and in consideration of the sum of one dollar, and other valuable considerations to me in hand paid by said Cowperthwaite, the receipt whereof is hereby acknowledged, I have sold, assigned, and transferred, and hereby do sell, assign, and transfer unto said Cowperthwaite, his legal representatives and assigns, all my right, title, and interest in and to said letters patent and invention thereby secured, or intended to be secured, the same to be held and enjoyed by the said Cowperthwaite, for his own use and behoof, and for the use and behoof of his legal representatives and assigns, to the full end and term for which said letters patent are or may be granted, as fully and entirely as the same could or would have been held and enjoyed by me had this assignment and sale not been made.

In testimony whereof, I have hereunto set my hand and affixed my seal this 19th day of March, 1856.

ALVA B. TAYLOR. [L. S.]

In presence of—
WALLACE P. GROOM.

U. S. PATENT OFFICE.

Received January 22, 1859, and recorded in Liber Bs of transfers of patents. In testimony whereof, I have caused the seal of the Patent Office to be hereunto affixed.

J. HOLT,
[L. S.] *Commissioner of Patents.*

Whereas Alva B. Taylor, of Newark, New Jersey, did obtain letters patent of the United States for improvements in machinery for making hat-bodies, bearing date the 18th day of March, 1856, which said letters patent were by him assigned and transferred to me the 19th day of March, 1856:

Know all men by these presents that I, George E. Cowperthwaite, of Danbury, Fairfield county, State of Connecticut, in consideration

of one dollar to me in hand paid, the receipt of which is hereby acknowledged, have sold, assigned, and transferred, and do hereby sell, assign, and transfer unto George E. Cowperthwaite, Nathan S. Starr, and Augustus Seely, composing the firm of G. E. Cowperthwaite & Co., the exclusive right to said letters patent and said
77 invention, the same to be held and enjoyed by the said G. E. Cowperthwaite & Co. for their own use and behoof, and for the use and behoof of their legal representatives to the full end of the term for which said letters patent are or may be granted, as fully and entirely as the same would or could have been held and enjoyed by me had this assignment and sale not been made.

In testimony whereof, I have hereunto set my hand and seal this 25th day of May, 1859.

G. E. COWPERTHWAITE. [L. S.]

Sealed and delivered in presence of—
A. C. SEELY.
WM. P. SEELY.

U. S. PATENT OFFICE.

Received and recorded June 4, 1859, in Liber H^5, page 179, of transfers of patents. In testimony whereof, I have caused the seal of the Patent Office to be hereunto affixed.

WM. D. BISHOP,
[L. S.] *Commissioner of Patents.*

Know all men by these presents that we, George E. Cowperthwaite, of the town of Danbury, in the State of Connecticut, and Nathan S. Starr and Augustus Seely, of the city and State of New York, for a valuable consideration to us in hand paid by Israel D. Condit, of the town of Milburn, in the State of New Jersey, the receipt whereof is hereby acknowledged, have assigned, transferred, and set over, and by these presents do assign, transfer, and set over to the said Israel D. Condit, the full and exclusive right to a certain invention and improvement in machinery for manufacturing hat-bodies, for which letters patent of the United States were granted to Alva B. Taylor, bearing date, March eighteenth, in the year one thousand eight hundred and fifty-six, and numbered 14,476, assigned by him to George E. Cowperthwaite, and by him assigned to the assignees herein mentioned, the same to be enjoyed and held by the said Israel D. Condit, his executors, administrators, and assigns, to the full end and term for which said letters patent are or may be granted, as fully and entirely as the same would or could be held and enjoyed by us if
78 this assignment and sale were not made.

In witness whereof, we have hereto set our hands and seals this twenty-fourth day of September, in the year one thousand eight hundred and fifty-nine.

G. E. COWPERTHWAITE.
NATHAN S. STARR. [L. S.]
AUGUSTUS SEELY.

Signed, sealed, and delivered in presence of—
A. E. TWEEDY.
A. B. TAYLOR.

U. S. PATENT OFFICE.

Received, April 26, 1860, and recorded in Liber R[5], page 397 of transfers of patents. In testimony whereof, I have caused the seal of the Patent Office to be hereunto affixed.

PHILIP F. THOMAS,
[L. S.] *Commissioner of Patents.*

Know all men by these presents that I, Israel D. Condit, of the township of Milburn, in the State of New Jersey, for a valuable consideration to me paid by Henry A. Burr, of the city and State of New York, the receipt whereof is hereby acknowledged, have sold, assigned, transferred, and set over, and by these presents do sell, assign, transfer, and set over to the said Henry A. Burr, the full and exclusive right to a certain invention and improvement in machinery for manufacturing hat-bodies, for which letters patent of the United States were granted and issued to Alva B. Taylor, bearing date March eighteenth, in the year one thousand eight hundred and fifty-six, by him assigned to George E. Cowperthwaite, by him assigned to George E. Cowperthwaite, Nathan S. Starr, and Augustus Seely, and by them assigned to me, to be held and enjoyed by the said Henry A. Burr, his executors, administrators, and assigns, to and for his and their use and behoof, to the full end and term for which letters patent are or may be granted, as fully and entirely as the same could or would be held and enjoyed by me if this assignment and sale had not been made.

79 In witness whereof, we have hereto set our hands and seals this thirty-first day of October, in the year one thousand eight hundred and fifty-nine.

ISRAEL D. CONDIT. [L. S.]

Signed, sealed, and delivered in the presence of—
DANIEL BARNUM.
A. C. N. PENNINGTON.

U. S. PATENT OFFICE.

Received, April 26, 1860, and recorded in Liber R[5], page 391 of transfers of patents. In testimony whereof, I have caused the seal of the Patent Office to be hereunto affixed.

PHILIP F. THOMAS,
Commissioner of Patents.

80 *Answer.*

Circuit court of the United States for the district of New Jersey.—In equity.

The joint and several answers of Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, defendants to the bill of complaint of Henry A. Burr, complainant.

The defendants now, and at all times hereafter, saving and reserving to themselves, and each of them, all benefit and advantage of exception which can or may be had or taken to the many errors, uncertainties, and imperfections, of the said complainant's said bill of complaint, contained for answer thereunto, or unto so much and such part thereof as these defendants are advised it is material for them to make answer unto, they, these defendants, severally answering, say:

That these defendants are informed and believe that letters patent were granted to Alva B. Taylor on the 18th day of March, 1856, and that the same were surrendered and reissued on the 21st day of August, 1860, as in said bill is alleged, but they do not know whether the same are correctly set out in said bill or not, and pray that complainant may be required to make due proof thereof.

These defendants, further answering, deny that errors were incorporated into the specification of said invention and improvements, by reason whereof, the said original letters patent were inoperative to secure to the owners thereof the full benefit and advantage of the invention, and these defendants allege the said surrender and reissue of the said original letters patent were not for any sufficient legal reason.

These defendants, further answering, say that they are not informed as to whether the said complainant is now the exclusive owner of said letters patent, as in said bill is alleged, and pray that, if material, complainant may be required to make due proof thereof.

These defendants, further answering, say that the said reissued letters patent, granted to Alva B. Taylor, are not for the same invention as the original letters patent, and that, by reason there-

81 of, the said reissued letters patent are null and void.

These defendants, further answering, say that the claim of said reissued letters patent is not such a one as the patentee is legally entitled to, and that by reason thereof, the said letters patent so reissued are void, and the defendants claim the same benefit of this objection as though the same had been duly taken by demurrer.

And these defendants, further answering, say that the said claim does not set forth a patentable subject-matter, and that by reason thereof said letters patent are void.

And these defendants, further answering, say that the claim of said letters patent is broader than the invention, and that by reason thereof the said letters patent are void.

And these defendants, further answering, say that the specification of said letters patent falsely set forth that if the cover be larger than the bat, it is not necessary that it should be perforated, and that

by reason of such false statement in the said specification the said letters patent are null and void.

And these defendants, further answering, deny that they have constructed or used any machine embodying substantially the same invention as that described and claimed in said reissued letters patent.

And these defendants, further answering, say that the machine used by the said defendants is patented by letters patent of the United States.

These defendants, further answering, deny that the said invention as described and claimed in said letters patent is practically operative.

These defendants, further answering, crave leave, at the hearing, to refer to the prior letters patent of Thomas Blanchard, dated June 14th, 1837; to the letters patent of William Fosket, dated 23d day of January, 1846, and reissued day of , 18 ; to the application, as well as the letters patent of Thomas R. Williams, of Newport, Rhode Island, dated 24th April, 1840; to the English letters patent of H. A. Wells, dated 30th June, 1837; to the letters patent of Stephen Hurlbut, dated 13th June, 1831; and also to the invention of I. C. Raacke, of 29th November, 1851, for the purpose of
82 showing the state of the art prior to the alleged invention of A. B. Taylor.

And these defendants pray that they may have the same benefit of the matter herein alleged, as if the same had been respectively pleaded in bar of the discovery and relief sought in the bill of complaint.

And these defendants deny all and all manner of unlawful combination and confederacy wherewith they are by the said bill charged, without this that there is any other matter, cause, or thing, in the said complainant's said bill of complaint contained, material, or necessary for these defendants to make answer unto, and not herein and hereby well and sufficiently answered, confessed, traversed, and avoided or denied, is true to the knowledge and belief of these defendants; all of which matters and things these defendants are ready and willing to aver, maintain, and prove, as this honorable court shall direct, and humbly pray to be hence dismissed, with their reasonable cost and charges in this behalf most wrongfully sustained.

COURTLANDT PARKER,
Solicitor for Respondents.

UNITED STATES OF AMERICA,
District of New Jersey, ss:

On the second day of March, A. D. 1861, personally appeared before me the within-named defendants, Peter S. Duryee and Henry H. Jaques, and being severally sworn, deposed and said that the facts contained in the foregoing answer, so far as the same are of their own knowledge, are true, and so far as the same are from information derived from others, they verily believe them to be true.

PETER S. DURYEE.
HENRY H. JAQUES.

Sworn and subscribed before me this 2d day of March, 1861.

S. S. MORRIS,
U. S. Commissioner for New Jersey, District in 3d Circuit.

83 U. S. circuit court, district of New Jersey.

HENRY A. BURR
vs.
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE.

The replication of Henry A. Burr, complainant, to the answer of the defendants.

This replicant, saving and reserving to himself, now and at all times hereafter, all and all manner of benefit and advantage of exception which may be had or taken to the manifold insufficiencies of the said answer, for replication thereunto says, that he will aver, maintain, and prove his bill of complaint to be true, certain, and sufficient, in the law to be answered unto; and that the said answer of the said defendants is uncertain, untrue, and insufficient, to be replied unto by this repliant, without this, that any other matter or thing whatsoever, in the said answer contained, material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed and avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to aver, maintain, and prove, as this honorable court shall direct, and humbly prays as in and by his said bill he has already prayed.

J. P. BRADLEY,
Solicitor and Counsel for Complainant.

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85 *Bill on Lansing E. Hopkins's patent, owned by H. A. Burr.*

Circuit court of the United States for the district of New Jersey.—In equity.

To the judges of the circuit court of the United States for the district of New Jersey:

Henry A. Burr, of the city, county, and State of New York, a citizen of the said State of New York, brings this his bill of complaint against Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, all of the city of Newark, in the county of Essex and the said State of New Jersey.

And thereupon your orator, humbly complaining, shows to your honors that heretofore, and before the twenty-first day of December, in the year one thousand eight hundred and fifty-two, Lansing E. Hopkins, of the said city of New York, a citizen of the said State of New York, invented certain new and useful improvements in machinery for making hat-bodies, whereof he was the original and first inventor, and which had not been known or used by others before his said invention of the same, and had not been in public use for more than two years before his application for letters patent therefor, nor had the same been on sale with his consent or allowance, as such in-

ventor, prior to his said application for letters patent therefor, as hereinafter mentioned; and that being such inventor, as aforesaid, and desirous to obtain an exclusive property in the said invention, he afterwards made application in writing to the Commissioner of Patents of the United States for such letters patent, expressing such desire as aforesaid, and delivered to the said Commissioner a written description, specifica ion, and drawings, and a model of the said invention, in due form of law, pursuant to the acts of the Congress of the United States in such case made and provided, and complied in all other respects with the requirements of the said acts; and that thereupon letters patent of the United States were issued under the seal of the Patent Office of the United States, signed by
86 the Secretary of the Interior, and countersigned by the said Commissioner, in due form of law, bearing date on the said twenty-first day of December, in the year one thousand eight hundred and fifty-two, and delivered to the said Lansing E. Hopkins, whereby there were granted to him, his heirs, administrators, or assgns, for the term of fourteen years from the date thereof, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention, a description and specification whereof are given in his words in the schedule annexed to the said letters patent, and the drawings accompanying the same, made a part thereof, as by reference to the said letters patent, now in the possession of your orator, ready to be produced as your honors may direct, or to a true copy thereof, hereto annexed as schedule A, and which he prays may be taken as a part of this his bill of complaint, will more fully and at large appear, and to which, for greater certainty, he prays leave to refer.

And your orator further shows to your honors, that after the issuing of the said letters patent, and on or about the twenty-eighth day of June, in the year one thousand eight hundred and fifty-three, the said Lansing E. Hopkins made and executed, under his hand and seal, and delivered to John H. Prentice and James H. Prentice, both of the said city of New York, an assignment and transfer, in due form of law, of all his right, title, and interest of and in the said invention so secured to him by the said letters patent as aforesaid, to be held and enjoyed by them, for their own use and behoof, and for the use and behoof of their legal representatives and assigns, to the full end of the term for which the said letters patent were so granted as aforesaid, as fully and entirely as the same would have been held and enjoyed by him if the said assignment had not been made; and that afterwards, and on or about the seventh day of September, in the year one thousand eight hundred and sixty, the said John H. Prentice and James H. Prentice, both then of the city of Brooklyn, in the county of Kings and the said State of New York, made and executed, under their hands and seals, respectively, and delivered to your orator, an assignment and transfer, in due form of law, of all
87 their right, title, and interest, respectively, of and in the said letters patent, and the said invention, right, and liberty thereby secured, to be had, held, and enjoyed by him for his own use and behoof, and for the use and behoof of his legal representatives,

and his and their assigns, to the full end of the term for which the said letters patent were granted, as fully and entirely as the same would have been held and enjoyed by them if the said assignment had not been made; both of which said instruments of assignment were duly recorded in the said Patent Office, as by reference to the said assignments, and the certificates of the said Commissioner of Patents of the receiving and recording thereof, indorsed thereon, respectively, now in the possession of your orator, ready to be produced as your honors may direct, or a true copy thereof, hereto annexed as schedule B, which he prays may be taken as a part of this his bill of complaint, will more fully and at large appear, and to which, for greater certainty, he prays leave to refer.

And your orator further shows to your honors, that the said Lansing E. Hopkins, after the issuing and delivery of the said letters patent as aforesaid, put his said invention into use, and that your orator is now the exclusive owner and possessor of the same.

And your orator further shows to your honors, that the said defendants, before and ever since the said seventh day of September, in the year one thousand eight hundred and sixty, have been and now are using at their factory in the said city of Newark, and within the jurisdiction of this court, in making and forming hat-bodies, divers, to wit: three machines, substantially similar to and embodying the said invention and the several improvements described and specified in and by the said letters patent, and the schedule and the drawings accompanying the same, and made part thereof, and thereby secured, in violation and infringement of the said letters patent, and of the full and exclusive right and liberty of and in the said invention and the several improvements secured thereby, and that they are now making and constructing, or causing to be made and constructed, at the said city of Newark, divers, to wit: fifteen machines, substantially similar to and embodying the said invention and the
88 several improvements so secured as aforesaid, and threaten and intend to use the same when so made and constructed at their said factory in the said city of Newark and elsewhere, in violation and infringement of the said letters patent, and the said right and liberty of and in the said invention and the said several improvements, contrary to equity and good conscience, and to the manifest wrong and injury of your orator in the premises; and that your orator has requested the said defendants to desist from such violation and infringement, but in vain.

In consideration whereof, and forasmuch as your orator can have adequate relief only in this court, where matters of this sort are properly cognizable and relievable, and to the end therefore that the said defendants may upon their several and respective corporal oath, and to the best of their knowledge, information, and belief, respectively, direct and perfect answer make to all the matters and things hereinbefore set forth, and that as fully and particularly as if the same were here again repeated, and they particularly interrogated thereto, and that they may be enjoined and restrained by a writ of injunction, issued out of and under the seal of this court, from making, constructing, or causing to be made or constructed, using, or vending to others

to be used, any machine or machines such as they are now using as hereinbefore set forth, or such as are substantially similar to or embody the said invention and improvements, or any of the same, so secured by the said letters patent as aforesaid, and so assigned to and owned by your orator as aforesaid, and that they may be decreed to account for and pay over to your orator the gains and profits by them made by the use of the said machines as aforesaid since the said seventh day of September, in the year one thousand eight hundred and sixty, and that your orator may have such other and further relief as may be consistent with equity and good conscience.

May it please your honors, the premises considered, to grant to your orator not only a writ of injunction, issuing out of and under the seal of this court, enjoining and restraining the said defendants from making, constructing, or causing to be made or constructed, using, or vending to others to be used, any machine or machines
89 such as they are now using as aforesaid, or such as are substantially similar to or embody the said invention and improvements, or any of the same, so secured as aforesaid, but also a writ of subpœna, issuing out of and under the seal of this court, commanding them to appear at a certain time and place in this court, to answer the premises, and to stand to and abide such orders and decrees herein as may be consistent with equity and justice.

And your orator, as in duty bound, will ever pray, etc.

JOSEPH P. BRADLEY,
Solicitor for and of counsel with complainant.

UNITED STATES OF AMERICA,
Southern District of New York:

Henry A. Burr, the complainant in the foregoing bill of complaint named, being duly sworn, says that the matters and things set forth in the said bill, so far as they relate to his own acts and deeds, are true, and so far as they relate to the acts and deeds of any other person or persons, he believes them to be true.

H. A. BURR.

Sworn and subscribed before me this 19th day of Nov., 1860.

R. E. STILWELL,
U. S. Commissioner.

90 No. 9484.

The United States of America to all to whom these letters patent shall come:

Whereas Lansing E. Hopkins, of New York, N. Y., has alleged that he has invented new and useful improvements in machinery for manufacturing of hat-bodies, which he states have not been known or used before his application, has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvements, and that the same have not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United

States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvements, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Lansing E. Hopkins, his heirs, administrators, or assigns, for the term of fourteen years, from the twenty-first day of December, one thousand eight hundred and fifty-two, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvements, a description whereof is given in the words of the said Hopkins in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand, at the city of Washington, this
[L. S.] twenty-first day of December, in the year of our Lord one thousand eight hundred and fifty-two, and of the independence of the United States of America the seventy-seventh.

ALEX. H. H. STUART,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

S. H. HODGES,
Commissioner of Patents.

91 THE SCHEDULE REFERRED TO IN THESE LETTERS PATENT, AND MAKING PART OF THE SAME.

To all to whom these presents shall come:

Be it known that I, Lansing E. Hopkins, of New York, in the county of New York and State of New York, have invented certain new and useful improvements in manufacturing hat-bodies, and that the following is a full, clear, and exact description of the principle or character which distinguishes it from all other things before known, and of the usual manner of making, modifying, and using the same.

Two difficulties have arisen in the construction of hat-bodies on an exhausted cone, which are, wetting the fibres in some way before they were removed from the cone; and, secondly, a want of compactness and consistency at that period of their manufacture. To wet the stock at this period, and then drying it before completing the manufacture, seriously injures it, compelling the manufacturers at once to work up the hat-bodies as fast as they are formed, or to seriously injure their property; and this in practice is found impossible. The bodies are made and sold to the trade, who manufacture them into hats, from time to time, afterwards. No method has been heretofore adopted of hardening the bodies without wetting them with water before they are taken from the cone, which I avoid in my process.

The apparatus is constructed as follows: I employ an endless feed-apron (*a*) and rollers (*b*,) together with a cylinder (*c*) armed with points called a "*picker*," all of which devices have long since been known and used in the manufacture of fur, and are well understood.

Below this picker I have a recess (*d*) which I call an inclosed air-chamber; this chamber communicates by a trunk or pipe (*e*) with the exhausting-fan hereafter described; through this chamber a current of air is driven by the exhaust-fan past the picker, driving forward the fur towards the cone (*f*) on which the hat-body is to be formed. The exhaust-fan (*g*) is a well-known device for exhausting the air from the cone upon which the hat-body is formed, and the air passing into it is driven forward into the air-chamber above named, which may also receive an additional supply from the fans (*h*) at the
92 sides of the picker. Upon the side of the cone opposite that at which the fur is received, I place a set of three, more or less, conical rollers (*i*) which press against the surface of the cone and turn as the cone revolves; on the curved part of the tip are several small rollers, clearly shown at fig. 2, which fit and adapt themselves to the curve, thus rolling over every part of the surface and pressing down the fur as it is worked; and to facilitate the interlocking and hardening the body to a consistency, I cause the rollers to have an end-chace by making inequalities in the revolving-rim upon which the cone sets, as at (*k*,) against which the ends of the journals of the rollers (*i*) rest, to move them up and down. A long pipe (*o*,) having a slit its whole length, and curved to the section of the cone, may be employed by covering the slit above named with cloth and letting a slight breath of steam out upon the fur simply to warm but not to saturate it; this, as well as the rollers, are jointed so as to be thrown back from the cone at pleasure. Before the cone is used, it is covered with a thin cloth cover made to fit it, which comes off with the body when made, and is then easily removed from it. The steam-tube is small and wound with cloth; and then a casing, also having a slit in it, is put on over the cloth to cover it; this is shown in fig. 3; (*m*) is the casing; (*n*) the tube covered with cloth; and (*o*) the steam-tube before the cloth is put on; this is an important construction, and is thus named and illustrated in detail. The purpose of the cloth cover over the cone is two-fold; first, experience shows that the fur, when formed directly upon the perforated metal-cone, slides down in little rolls, occasionally injuring the fabric and giving much trouble; this the cloth entirely prevents, and as it is taken off with the fur body, it can, if necessary, be retained in the body to further harden it before being finally removed, while, at the same time, the operation goes on without removing the cone from the seat.

I do not claim the conical vibrating-rollers for the purpose of felting or compressing a bat, or the cone separately, as that is well known.

But I claim combining the hardening-rollers with the perforated cone by means of a yielding or hinged frame, in which they are placed substantially in the manner and for the purpose herein described.

I also claim giving to said rollers, in combination with said
93 perforated cone, a vibrating endwise motion, as well as a rotary motion, substantially as described, and for the purpose set forth.

I also claim blowing the exhaust-air from the former (*f*) into the chamber (*d*) for the purpose and in the manner described. And I also claim the mode of forming the steam-pipe outlet, as above specified, by

covering the steam-pipe with cloth, and in casing it with an outer metal-case. I also claim covering the perforated cone preparatory to a deposition of fur thereon, with a covering of thin cloth, easily pervious to air, upon which the fur is to be deposited, said cloth or fabric to be removed at each operation with the hat-body deposited thereon.

LANSING E. HOPKINS.

Witnesses: J. BECKWITH WEST.
T. C. DONN.

94 *The United States Patent Office to all persons to whom these presents shall come, greeting:*

This is to certify that the annexed is a true copy from the records of this office.

In testimony whereof, I, Philip F. Thomas, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed, this fifth day of September, in the year of our Lord one thousand eight hundred and sixty, and of the independence of the United States the eighty-fifth.

[L. S.] PHILIP F. THOMAS.

Whereas I, Lansing E. Hopkins, of New York, in the county of New York and State of New York, did obtain letters patent of the United States for certain new and useful improvements in the manufacture of hat-bodies, which letters patent bear date the twenty-first day of December, one thousand eight hundred and fifty-two; and whereas John H. Prentice and James H. Prentice, both of New York, in the county of New York, and State of New York, are desirous of acquiring an interest therein: Now this indenture witnesseth, that for and in consideration of the sum of one dollar to me in hand paid, and other valuable consideration, the receipt of which is hereby acknowledged, I have assigned, sold, and set over, and do hereby assign, sell, and set over, all the right, title, and interest which I have in the said invention, as secured to me by said letters patent, the same to be held and enjoyed by the said John H. Prentice and James H. Prentice, for their own use and behoof, and for the use and behoof of their legal representatives, to the full end of the term for which said letters patents are granted, as fully and entirely as the same would have been held and enjoyed by me had not this assignment been made.

In testimony whereof, I have hereunto set my hand and affixed my seal this twenty-eighth day of June, one thousand eight hundred and fifty-three.

LANSING E. HOPKINS. [L. S.]

Witness: THOMAS E. WARREN.

Received and recorded June 30th, 1853.

95 Whereas Lansing E. Hopkins, of the city, county, and State of New York, heretofore obtained letters patent of the United States for certain new and useful improvements in machinery for

manufacturing hat-bodies, which letters patent bear date on the twenty-first day of December, in the year one thousand eight hundred and fifty-two, and are designated as number (9484) nine thousand four hundred and eighty-four; and whereas the said Lansing E. Hopkins heretofore assigned, sold, and set over the said letters patent to us, John H. Prentice and James H. Prentice, both of the city of Brooklyn, in the county of Kings, and the said State, our heirs, administrators, or assigns, by a deed of assignment, under his hand and seal, and bearing date on the twenty-eighth day of June, in the year one thousand eight hundred and fifty-three, which said deed of assignment is duly recorded in the Patent Office; and whereas Henry A. Burr, of the said city of New York, desires to procure an assignment of the said letters patent: Now this indenture witnesseth, that for and in consideration of the sum of one dollar, to us in hand paid by the said Henry A. Burr, and other good and valuable considerations us thereto moving, the receipt whereof is hereby acknowledged, we have assigned, sold, and set over to the said Henry A. Burr all the right, title, and interest which we and each of us have or has, of and in the said letters patent, and the invention, rights, and liberty secured thereby, to be had, held, and enjoyed by the said Henry A. Burr, for his own use and behalf, and for the use and behalf of his legal representatives, and his and their assigns, to the full end and term for which the said letters patent are granted, as fully and entirely as the same would have been held and enjoyed by us if this assignment had not been made.

In testimony whereof, we have hereto set our hands and seals this seventh day of September, in the year one thousand eight hundred and sixty.

JOHN H. PRENTICE. [L. S.]
JAMES H. PRENTICE. [L. S.]

Signed, sealed, and delivered in the presence of—
GEORGE COLYER.

96 U. S. PATENT OFFICE.

Received and recorded September 13th, 1860, in Liber Z⁵, page 25, of transfers of patents.

In testimony whereof, I have caused the seal of the Patent Office to be hereunto affixed.

PHILIP F. THOMAS,
Commissioner of Patents.

Answer.

Circuit court of the United States for the district of New Jersey.—In equity.

The joint and several answers of Peter S. Duryee, Henry H Jaques, and Henry W. Duryee, defendants to the bill of complaint of Henry A. Burr, complainant.

These defendants now, and at all times hereafter, saving and reserving to themselves, and each of them, all benefit and advantage of ex-

ception which can or may be had or taken to the many errors and uncertainties, and other imperfections in the said complainant's bill of complaint contained for answer thereunto, or unto so much and such parts thereof as these defendants are advised is or are material or necessary for them to make answer unto, they, these defendants, severally answering, say:

That these defendants are informed and believe that letters patent were granted to Lansing E. Hopkins on 21st day of December, A. D. 1852, as in said bill is alleged, but they do not know whether the same are correctly set out in said bill or not, and pray that the complainant may be required to make due proof thereof.

These defendants, further answering, say that they do not know whether the said several assignments were made or not, as in the said bill is alleged, and pray that, if material, the complainant may be required to make due proof thereof.

97 These defendants, further answering, say that the several inventions set forth and claimed in the said several letters patent of said Lansing E. Hopkins were not useful at the time of the grant of said letters patent, and that the said several inventions have not been put in use since the issue and delivery of said letters patent, but, on the contrary, the attempt to put the said inventions into use was unsuccessful, and the said inventions were abandoned; and that by reason of the want of utility of the said invention or inventions, the said letters patent of the said Lansing E. Hopkins are null and void.

These defendants, further answering, deny that they are now or have been using machines similar to or embodying the principles described and claimed in the said letters patent of the said Lansing E. Hopkins.

These defendants, further answering, crave leave at the hearing to refer to the prior letters patent of Thomas Blanchard, dated June 4th, 1837; to the letters patent of William Fosket, dated January 23d, 1846, and reissued on the day of 18—; to the letters patent and application of Thomas R. Williams, of Newport, Rhode Island, dated April 24th, 1840; to the English letters patent of Henry A Wells, dated June 30th, 1837; to the letters patent of Stephen Herbert, dated June 13th, 1833; and to the letters patent of Burr & Taylor, of February 9th, 1847, for the purpose of showing the state of art prior to the alleged invention of said Lansing E. Hopkins.

And these defendants pray that they may have the same benefit of the matters herein alleged as if the same had been respectively pleaded in bar of discovery and relief sought in the bill of complaint

And these defendants deny all and all manner of unlawful combination and confederacy wherewith they are by the said bill charged, without this that there is any other matter, cause, or thing in the said complainant's said bill of complaint contained material or necessary for those defendants to make answer unto, and not herein and hereby well and sufficiently answered, confessed, traversed, and avoided, or denied, is true, to the knowledge and belief of these defendants; all

98 of which matters and things these defendants are ready and willing to aver, maintain, and prove, as this honorable court

shall direct, and humbly pray to be here dismissed, with their reasonable costs and charges in this behalf most wrongfully sustained.

COURTLANDT PARKER,
Solicitor for Respondents.

UNITED STATES OF AMERICA,
District of New Jersey, ss:

On the second day of March, A. D. 1861, personally appeared before me, the within-named defendants, Peter S. Duryee and Henry H. Jaques, and being severally sworn, deposed and said that the facts contained in the foregoing answer, so far as the same are of their own knowledge, are true, and so far as the same are from information derived from others, they very believe them to be true.

PETER S. DURYEE.
HENRY H. JAQUES.

Sworn and subscribed before me this 2d day of March, A. D. 1861.

S. S. MORRIS,
U. S. Commissioner for New Jersey district, U. S. Court.

99 U. S. circuit court, district of New Jersey.

HENRY A. BURR
vs.
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE.

The replication of Henry A. Burr, complainant, to the answer of the defendants.

This replicant, saving and reserving to himself, now and at all times hereafter, all and all manner of benefit and advantage of exception which may be had or taken to the manifold insufficiencies of the said answer, for replication thereunto, says that he will aver, maintain, and prove his bill of complaint to be true, certain, and sufficient, in the law to be answered unto; and that the said answer of the said defendants is uncertain, untrue, and insufficient, to be replied unto by this repliant, without this, that any other matter or thing whatsoever, in the said answer contained, material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed, and avoided, traversed or denied, is true; all which matters and things this repliant is and will be ready to aver, maintain, and prove, as this honorable court shall direct, and humbly prays as in and by his said bill he has already prayed.

J. P. BRADLEY,
Solicitor and of Counsel for Complainant.

100

101 *Stipulation.*

U. S. circuit court, district of New Jersey.—In equity.

HENRY A. BURR
versus
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE. } Bill on Wells's patent.

THE SAME
vs.
THE SAME. } Bill on Hopkins's patent.

THE SAME
vs.
THE SAME. } Bill on Taylor's patent.

For mutual convenience, it is hereby stipulated and agreed, by and between the complainant and the defendants in the above-entitled suits, that all testimony and evidence, documentary and other, which shall be taken before, and certified by, Kenneth G. White or Richard E. Stilwell, in the city of New York, commissioners of the United States court for the southern district of New York, may be read and used in said suits, or any of them, with the same effect as if the same had been duly taken before an examiner duly appointed for the circuit court of the United States for the district of New Jersey.

Dated August. 27, 1861.

JOSEPH P. BRADLEY, *Compl't's Sol'r*,
By GEORGE GIFFORD, *of Counsel.*
COURTLAND PARKER, *Def't's Sol'r.*
GEORGE HARDING, *of Counsel.*

102

103 *Complainant's evidence.*

UNITED STATES OF AMERICA,
Southern District of New York, City,
County, and State of New York, ss:

Be it remembered that on this twenty-eight day of August, in the year of our Lord one thousand eight hundred and sixty-one, I, Kenneth G. White, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No 41 Chambers street, in the

city of New York, in the said southern district of New York, in the State aforesaid, William Dykes, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy, now depending and undetermined, in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, are defendants in each of said suits.

And the said William Dykes, being about the age of thirty-one years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said William Dykes, and he did thereupon depose, testify, and say as follows, viz.

104 Present: George Gifford, counsel for complainant, and George Harding, counsel for defendants.

Q. 1. What is your name, age, residence, and occupation?

A. William Dykes; age, thirty-one years; am now in the army, in the 2d New Jersey regiment, stationed about six miles from Alexandria, Virginia.

Q. 2. How was you able to get here to give your evidence?

A. I received a subpœna and came upon a furlough.

Q. 3. Have you ever worked for the defendants, Duryee, Jaques & Co., in forming hat-bodies by machines; and if yea, when and where?

A. I have, in Newark, New Jersey. I think I went into their employ in August, 1860, and left their employ in April, 1861. I think I left their employ in latter part of April.

Q. 4. What did you leave for?

A. To proceed to Virginia with a company to which I was attached.

Q. 5. How many machines for forming hat-bodies had the defendants in operation when you first commenced to work for them; and by what names were they called, and where situated in the building?

A. They had two, known as the Burr machine; two finished machines, known as the Boyden machine, and one unfinished Boyden machine. The Burr machines were situated in the basement, and the Boyden machines in the 3d story, in the rear building, on the premises.

Q. 6. Why was one kind called Burr machines, and the other kind called Boyden machines? In what capacity did you work for the defendants?

A. The Burr machines were the kind owned by Burr, and the kind of machines that he runs in his place; and the others were the machines built by Seth Boyden. I was employed by the defendants to superintend the making of hat-bodies in the Boyden machine department. I did this.

Q. 7. Look at the model marked "Exhibit A, K. G. White, U. S. com'r," and state what that represents?

A. With the exception of the adjusting apparatus, upon the jigger or hardening frame, it represents the first Boyden machines I

105 saw in operation at the manufactory of Duryee, Jaques & Co. It is somewhat different in form from the other two.

Q. 8. What do you mean by the exception mentioned in your last answer?

A. The difference in the shifting apparatus for shifting the jigging frame so as to adjust it to different-sized cones.

Q. 9. I want you to explain what difference you mean.

A. The hinges upon the Boyden machine were made of a slotted piece of iron, crooked so as to form a portion of a circle, and were adjusted by bolts and screws so as to slide backwards and forwards.

Q. 10. Are not slots in the projecting iron bars of the hinged hardening frame in model Exhibit A; and are not those slots for adjusting or sliding the frame towards and from the cone?

A. These are slots, and they would answer that purpose for some shaped cone, but not for all.

Q. 11. How, then, did the Boyden machine differ from model A?

A. These are straight, and in the Boyden they are bent.

Q. 14. What would be the difference in operating the frame where those bars were bent, from operating it when the bars were straight?

A. The straight ones slide backwards and forwards upon the same angle, and in the bent one the angle of the frame can be altered.

Q. 15. You stated that model Exhibit A, with the exception you have been explaining, is like the first Boyden machine you saw operated at defendants' factory, and that there was one other there finished and one unfinished; how does model A differ from the last two?

A. In the last two the picking apparatus was higher, and a greater distance from the base of the cone.

Q. 16. State whether the last two contained the same parts in kind as the first one.

A. They did.

Q. 17. In model Exhibit A is an enameled piece of cloth; what did that part do in the machine?

A. It was used for hardening and felting.

Q. 18. How did it do that?

106 A. By means of a jiggering and vibrating motion given to it.

Q. 19. In model Exhibit A I see a hinged copper piece below the picker and between it and the cone; for what was that used in the operation of the machine?

A. For giving direction to the current of air from the exhausting fan, for the purpose of aiding the operation of forming the bat.

Q. 20. How was it used for that purpose, and by whom, while the bat was being formed?

A. It was used by being opened and closed by the person operating the machine.

Q. 21. In the use of it, was it always closed or always wide open? explain about that.

A. It was not; sometimes it was entirely closed, and sometimes entirely open, and at times at any angle that might be necessary.

Q. 22. For what purpose would it be used at different angles or degrees of opening; what made the necessity of varying the extent of its opening?

A. It was used for the purpose of directing the current of air to keep the fibres of fur from falling upon the table. The necessity for varying the extent of the opening was to get the proper regulated quantities of fur upon the cone.

Q. 23. I see in model Exhibit A, between the picker and the cone, and above the hinged flap last spoken of, a wooden piece rounding up in the center, the rounding part beveled towards the picker, and the ends beveled from the picker. What was that piece used for in operating the machine?

A. For the purpose of giving directions to the fibres of fur towards the cone.

Q. 24. In operating those machines of defendants, was any other means used for distributing the fur upon the cone while the bat was being formed by the machine than is represented in the model A; and if yea, what means was it, and how was it used?

A. Sometimes we might take one hand, or a piece of paper, and hold it in front of the picker for the purpose of elevating the fur upon the tip of the cone.

107 Q. 25. Did you, in operating the machine, use paper for that purpose; and if yea, what kind of paper as to thickness, and what shape?

A. Sometimes I did; the paper that ordinarily came round fur—about as stiff as ordinary drawing-paper. It was square—about six or eight inches square.

Q. 26. What occasioned the necessity for so using paper in forming the bat?

(Objected to, because witness has not stated that it was necessary.)

A. In using coarse, heavy fur, it was a difficult matter to get the tips of the bats heavy enough without the aid of something of that kind.

Q. 27. What was the use, in making bats by the machine, of having the frame which supports the enameled cloth hung by a hinge, so as to turn to and from the cone?

A. It was the most convenient way it could be used, to allow the bat to be formed upon the cone.

Q. 28. While the fur was being deposited on the cone, was the enameled cloth turned towards the cone or away from the cone?

A. In the first of the forming the bat, the enameled cloth was invariably turned away from the cone, and sometimes before the bat was completed the enameled cloth was drawn against the cone, and the hardening of the bat commenced. Sometimes the cloth would be left off till the bat was formed, then the cloth brought against the cone and the bat hardened.

Q. 29. Was the cloth jiggered or vibrated while the bat was being formed, and the cloth was turned away from the cone?

A. It was not.

Q. 30. How was the jiggering or vibrating motion given to the cloth, or taken from it?

A. By drawing the jiggering-frame towards the cone, and tighten-

ing the belt which was attached to a shaft upon the jiggering-frame. When the frame was moved back the belt was slack.

Q. 31. How was it as to the air being exhausted from the perforated cone while the bat was being hardened by the enameled cloth?

108 A. The full pressure of the exhaust was upon the bat and cone while it was being hardened.

Q. 32. Did the cone revolve while the bat was being hardened, or was its rotation stopped after the fur was deposited upon it and before the hardening?

A. Sometimes we found it necessary to stop the rotation of the cone and the first application of the hardening apparatus, and move it slowly around by hand; at other times we applied the hardening apparatus while the cone was revolving.

Q. 33. What was your general practice as to stopping the revolution of the cone, or allowing it to continue while the bat was being hardened?

A. We generally applied the hardening apparatus while the cone was revolving its usual speed.

Q. 34. In the model A I see a pipe or conductor extending from the box of the exhaust-fan to below the picker, and communicating with the slot or opening over which is hung the hinge-flap, the operation of which you *you* have explained. Please explain what that pipe or conductor was used for in the operation of the machine.

A. Used for the purpose of conducting a blast of air from the exhausting-fan, which was discharged through the slot or opening in front of the picker.

Q. 35. In that pipe or conductor I see a sliding-shutter. Please explain what that sliding-shutter was used for in the operation of the machine.

A. It was shoved in or drawn out so as to admit a less or greater quantity of air into the conductor.

Q. 36. Why did you sometimes want to admit a less quantity through the conductor than at other times?

A. We did not need so strong a blast from the exhausting-fan.

Q. 37 Why not?

A. Some kinds of fur are heavier than others, and required more power to carry them forward to the cone.

Q. 38. In the box of the exhaust-fan are two doors or outside shutters, one in the end towards the hardening-fan, and the other on the side of the box. Please explain what those windows were used for respectively in the operation of the machine.

109 A. I never saw one on the side of the machine; the one on the end was open after the bat was hardened upon the cone, so as to partially cut off the pressure of the exhaust, so as to admit of the bat being drawn from the cone without straining.

Q. 39. The plate to which the hardening-frame hooks when against the cone is slotted and held down by screws. What were these slot for?

A. To allow the plate to be shifted backwards and forwards for the purpose of drawing the hardener closer to or further from the cone. This was done when they changed the size of the cone. Sometimes we

shifted it a little further off for the same sized cone; one kind of a hat would not require so hard a pressure as another.

Q. 40. In the model I see a picker other than the one already spoken of. What was that picker for?

A. For disintegrating the fibres of fur and throwing them forward towards the other picker.

Q. 41. How did this disintegrating picker receive the fur?

A. By being fed by an apron.

Q. 42. How did the second picker receive the fur?

A. By being fed with an apron, same as the other. One is fed on by hand, and the other is fed by the disintegrating picker.

Q. 43. How was it as to using nipping-bars to present the fur to the pickers.

A. The aprons passed over the edges of the nipping-bars, and the fur was taken from between the edges of the nipping-bars.

Q. 44. Was the apron between the fur and the nipping-bars as the fur was presented to the picker?

A. The aprons passed over and outside of the nipping-bars. The aprons were between the fur and the nipping-bars.

Q. 45. Was there an apron each side of the fur that was nipped between the bars?

A. Yes.

Q. 46. What was the object in the machine of those nipping-bar?

A. To present a straight, even surface to the picker, and to hold the fur, so that it would be properly picked, in contact with the picker.

110 Q. 47. Please examine model A, and see if the nipping-bars are under the aprons.

A. They are not in the model.

Q. 48. Are there any bars with the model to represent them?

A. There are two.

Q. 49. Were there alterations made in those Boyden machines in operation with the defendant; and if yea, when?

A. We were continually altering them, or almost continually.

Q. 50. I mean material alteration. Were they altered as to the conductor of the blast of air; and if yea, how and when?

A. Immediately after Mr. Burr got an injunction against Duryee and Jaques, the defendants, the blast of air was cut off from the exhausting-fan. We had a new front put on in front of the picker. The form of the front was altered at or about that time, and afterwards a flange for a driving-shaft was substituted in place of the blast of air from the exhaust.

Q. 51. Look at the model marked Exhibit B, and state what that represents.

A. It represents the Boyden machine in its altered form, with the exception that the fan is placed nearer the side in the model than it was in the machine, and except the wooden piece marked A B C, and the nipping-bars, are not in the model, and the bars on the hardening frame in the model are not as much bent as they were in the machine.

Q. 52. What was the front, between the hinge-flap or valve and the picker, hollowed out for in the machine?

A. That was the form of the front; it was to give direction to the air, I suppose.

Q. 53. What air?

A. The air which was thrown up by the fan.

(The witness, putting his finger on the hollow to which his last question referred, says: "Did you understand me to say that we altered its form here in the machine?" Counsel for complainant answered: "No." The witness said: "We did not alter it." The witness putting his finger on top of the front-piece, and says: "We altered it here.")

Q. 54. Does a comparison of model A and model B show how it was altered in front of the picker?

111 A. Yes. As to these fronts, some were much thicker than others, and fuller in the centre.

Q. 55. In model, Exhibit B, is a crank to the valve which is below the picker. What was that crank used for in operating the machine?

A. For the purpose of setting the valve to proper angles.

Q. 56. How did you determine what was the proper angles?

A. Determined by the judgment of the person operating the machine.

Q. 57. From what would the operator determine?

A. By the appearance and feeling of the bat upon the cone.

Q. 58. Did he turn it during the process of forming a bat?

A. Yes, sir.

Q. 59. Once, or more than once?

A. As often as necessary.

Q. 60. Necessary for what?

A. For the proper deposit of the fur upon the cone.

Q. 61. Was model B the form of the Boyden machine which the defendants used at the time you left their employment, with the exception you have mentioned?

A. Yes, sir; they had just altered one of that form.

Q. 62. Had they altered the other two?

A. I think only one of them were altered.

Q. 63. Which form of machine was best—like Exhibit A, or like Exhibit B?

A. In my opinion, Exhibit A, with the exception of the alteration of the step on the front; I should prefer steps like Exhibit B.

Q. 64. Why, then, like the form of Exhibit A best?

A. My opinion is, you could do more work with it; it would work faster.

Q. 65. What were done with the hat-bodies formed by the so-called Boyden machines?

A. They were sent to the parties to whom they were ordered to be sent.

Q. 66. What parties?

A. To hatters for whom they were formed, and who usually found the fur of which the bats were formed.

112 Q. 67. Do you know what was done with all the hat-bodies which were formed on the so-called Boyden machines which you say were in a room in the basement?

A. With the Burr machines I had nothing whatever to do; I know some of the bats were used in Duryee, Jaques & Co.'s, and I suppose all.

Q. 68. Do you know how many Burr machines were used in that basement while you were there?

A. They had two; I was in and out frequently.

Q. 69. Did you while there, and while the two Burr machines were in the basement room, see any other Burr machine or parts of a Burr machine, at any place within the factory?

(Objected to, because it implies that the Boyden machine is a Burr machine, which the witnesss has not said.)

I mean of the form of the two Burr machines, and which you have said were of the form that Mr. Burr used himself.

(Objection continued.)

A. I saw a new fan-box there, which is a part of new Burr machine. I am not positive whether there was one or two fan-boxes. I saw it in the top story of the building.

(Counsel for defendants objected in time to the production of Exhibit A in this case, and the testimony in reference to it, inasmuch as this machine was not tried at defendants' factory until after the complainant's bill was filed, and at the same time to state that he has no objection to the investigation of the machine which he supposes this model is intended to represent, provided the defendants be allowed to produce the other machine tried by them since the filing of the bill, and which the defendants propose to use hereafter, which last machine will be run at the defendants' factory, at a convenient time, for Mr. Gifford and his witnesses to see.

Complainant's counsel says: I have already, and a considerable time since, asked the privilege of seeing the defendants' machine, with the witnesses, operated, and have not had the privilege granted, and even at this late day, will accept the offer of the defendants' counsel to allow us to see the operation of the machine they propose to use.)

Adjourned till August 29, at 10 o'clock.

113 August 29, 1861, counsel for respective parties present.

Cross-examined by George Harding, esq., counsel for defendants.

X. 70. Were not the Burr machines, as you have called them, kept separate and distinct from the Boyden machine at defendants' factory?

A. They were.

X. 71. Have you made affidavit in these cases?

A. I have.

X. 72. Examine affidavit now shown you, marked No. 1, and state whether the statements therein made are correct.

(Counsel for the complainant objects to the admission of the so-called affidavit as evidence, and objects to the question.)

A. Yes, it is correct; the statements are correct.

X. 73. Examine copies of affidavits now shown you, and marked No. 2 and No. 3, and state whether the statements therein contained are correct.

(Counsel for complainant objects to the introduction, in evidence, of the papers marked No 2 and No. 3, on the ground that there is no evidence that they are copies of affidavits; that many of the statements therein contained are irrelevant and immaterial to the issues in these causes, and would needlessly incumber the record; and that many of the statements therein contained are not in the nature of a cross-examination, but are on different and other matters, and among them matters of expert conclusions, and the witness has not been examined as an expert; and because putting in evidence papers, in any large quantities, of irrelevant statements, mixed with the few that might be relevant, is an improper way of taking testimony; and because prepared written statement of alleged facts, and putting such statement in the hands of the witness, and asking him whether they are correct, is not a legal or proper way of proving such alleged facts, but the witness should be interrogated on them severally; and because the introduction of such papers does not give the witness proper
114 opportunity of considering the statements severally, and they may be placed in such relation as to be of a construction different from his understanding of it, and therefore mislead and deceive him.)

(Witness inquires of defendants' counsel whether my answer to the question would apply to the machines up to the present date, or only to the time when the affidavits were made.

The counsel for defendants answers: That the question relates to the correctness of the statements therein contained, understanding, of course, that the description of defendants' machine refer to those used at and prior to the date of making affidavit.)

A. Yes, sir; they were correct at that time.

X. 74. Has any change been made in the construction of the hardening apparatus during the time that you have been in the defendants' employ?

A. None that I am aware of.

X. 75. Have not other machines been used by defendants between the time of the injunction and the latter part of April, when you say the machine like Exhibit B was fitted up, which machines differ both from model A and model B?

A. There were.

X. 76. Had those machines any connection between the exhaust-fan under the cone and the picker?

A. No, sir; none.

X. 77. Had those machines any auxiliary blast from a fan-blower of any kind?

A. They did not.

X. 78. Were not all the machines of the defendants, between those dates, used without any auxiliary blast to the picker?

A. They were used a portion of the time. They were not all run steadily during that time.

X. 79. How was it as to all the machines run between those dates, as to the use of an auxiliary blast of any kind?

A. Down to the time of the construction of the machine like Exhibit B, they were run without using an auxiliary blast.

X. 80. What length of time was this?

115 A. I do not remember.

X. 81. Were not large numbers of merchantable hat-bodies made on those machines during that time?

A. We did not form many hat-bodies during that time.

X. 82. How many merchantable hat-bodies were made during that time?

A. I don't know.

X. 83. Have you no idea?

A. No, sir.

X. 84 How many merchantable hat-bodies were made on the machine like Exhibit B—that is, with the auxiliary blast, by the independent fan-blower?

A. I cannot tell.

X. 85. How many days was it used?

A. That I can't answer; I don't know.

X. 86. Was not the use of that fan-blower dispensed with on the machine like Exhibit B at times?

A. Not to my knowledge.

X. 87. Was it run a week—I mean the machine like Exhibit B—with the auxiliary fan-blower?

A. I left their employ shortly after the fan-blower was attached to the machine, and it was on when I left.

X. 88. Are you certain that the valves on Exhibit A in the model was of the proportionate size in the original machine?

A. I am not.

X. 89. Was the hinge placed in the same position?

A. I don't recollect; it worked the same as in the model.

X. 90. Who made this hinge-valve on Exhibit A?

A. I do not know.

X. 91. Was it made before it was shown to you on the model?

A. I saw it before it was attached to the model.

X. 92. Where was it made?

A. In Mr. Burr's establishment.

X. 93. Do you know whether the valve on Exhibit B is in a proper proportion to that on the original machine?

A. I do not to a certainty; I should think that it was a little larger than on the original, in proportion.

X. 94. Were not the hat-bodies which were formed on the

115 machines, without the use of the auxiliary blast, merchantable hat-bodies?

A. I suppose they were.

X. 95. Have you not seen hat-bodies made on the machine like Exhibit B, without changing the position of the valve during the formation of a body?

A. Not with that form of front attached to the machine.

X. 96. With what form of front have you seen hat-bodies made, without changing the position of the valve during the formation of a hat-body?

A. There was no valve attached to the machine, at the time that I seen bodies formed, with a different styled front.

X. 97. Which style front had it at the time you saw it make bodies, without moving the valve?

A. Neither like the front of Exhibit A or Exhibit B.

X. 98. Why did you not give directions to make a model of the machine which you have seen used, without moving the valve?

A. It was none of my business.

X. 99. Have you not seen hat-bodies made without placing the hand or a piece of paper on the Boyden machine, as you have stated in your examination in chief?

A. I have.

X. 100. How often did you use the hand or a piece of paper?

A. Frequently.

X. 101. Who applied to you in reference to testifying here in the first instance?

A. I received a subpœna from the adjutant of our regiment, with orders to report to General Kearney's headquarters, where I received my furlough.

X. 102. Had you any communication with any one in reference to the subject prior to that?

A. No, sir.

X. 103. Was nothing said to you about coming here to superintend models and testifying?

A. No; never.

X. 104. When was the subject first mentioned to you?

17 (Objected to, because it assumes superintending models has been mentioned to him.

A. I wished to be distinctly understood that I had nothing to do with superintending models or building them. Nobody said anything to me about it. The first person who spoke to me about the testimony I was to give in this case was Mr. Gifford.

X. 105. Who pays your expenses?

A. That is something I have got yet to find out.

X. 106. How long is it since you have seen the machine like Exhibit B?

A. I have not seen it since I left the employ of Duryee, Jaques & Co.

X. 107. In what respect are the steps superior to the curved front on the Boyden machine?

A. They are more easily changed, so as to adapt a different shaped front to a different cone.

X. 108. Does the front require to be changed to different size or shaped cones on the Boyden machines?

A. Sometimes alterations have to be made.

X. 109. What is the effect of the different shaped front on the fur? How did the fronts vary with the different cones?

A. It would have a tendency to give a different direction of the fur toward the cone. A deep or tall cone would require a front higher in the center.

X. 110. Did you always change these fronts as you changed the cones?

A. Not always.

X. 111. Is not Model A defective in not having a hole for the exhaust-air to pass through below?

A. It is.

X. 112. Is that hole left open during the operation of the machine?

A. It was.

X. 113. There was only a portion of the exhaust, then, that passed up in front of the picker?

A. That was all I mean; only a portion.

Redirect resumed.

118 Q. 114. What mechanic fixed up Exhibit B by putting in an extra blower, changing the front-guide, and in other respects mentioned by you?

A. Seth Boyden.

Q. 115. In your cross-examination, at interrogatory 96, you say that at the time the Boyden machine made a hat-body without moving the valve, it had a front not like the front of Exhibit A or that of Exhibit B. Please describe what form of front it then had.

A. On one of the forms there was attached to the front, like Exhibit A, a piece corresponding in form with the top of the front, working upon a hinge.

Q. 116 Please explain the meaning of your last answer more in detail.

A. There was a piece corresponding to the form of the top of the front-piece like in Exhibit A, and that was hinged so as to be turned up and down.

Q. 117 What was that piece hinged to?

A. To the front.

Q. 118. Do you mean that it was hinged to a front-piece of the shape of the rounding front-piece in Exhibit A?

A. I do.

Q. 119. To what part of that rounding front-piece was the other piece hinged?

A. To the ends near the top.

Q. 120. You say that was one of the forms of the front when the machine made a hat-body without the valve below the picker, like in Exhibit A. Did the machine so make a hat-body with any other form of front?

A. It did.

Q. 121. Please explain what other form of front.

A. A form like Exhibit A, with the exception of being hollowed, with an opening in front below the raise in the center of the front-piece, to which was attached a spout over the opening, through which was driven the current of air created by the picker.

Q. 122. You say that between the time of the injunction obtained by Mr. Burr against the defendants and the time Exhibit A
119 was fixed up with the additional blower, the Boyden machine did not use an auxiliary blast of air to the picker, and you have also stated that the machines were not used much that time.

Please state whether they were used for anything during that time except experiments.

A. They were; we formed bodies for outside parties.

Q. 123. To what extent during that time?

A. I am unable to answer that question. I have no idea without referring to their books.

Q. 124. What was the extra fan-blower in Exhibit B put on for?

A. For the purpose of aiding in the process of forming hat-bodies; the machine did not work well without it.

Q. 125. During that same time were the so-called Burr machines in operation in the basement?

A. I believe they were.

Q. 126. When the Boyden machines were used to make hat-bodies, between the time of the injunction and the time of fixing up Exhibit B, how was the fur directed from the picker to the cone?

A. By means of the fronts that I have just endeavored to describe.

Q. 127. Mr. Dykes, you have been asked on the cross-examination about the absence of a hole in the bottom of Exhibit A, for the exit of the air, as if the absence of the hole was regarded as an important matter. Please turn up the model and with the point of your knife mark out a place where the hole should be; have you done so?

A I have done it.

Q. 128. Is not the hole absent also in Exhibit B?

A. It is.

Q. 129. Please represent the place of the hole in that model by marking it as you did Exhibit A.

A. I have done so.

Q. 130. For whom or which party did you make the affidavits spoken of in your cross-examination, and what Mr. Treadwell was you acting in connection with, as mentioned in the paper offered in evidence as a copy of one of your affidavits?

120 A. The affidavits were made for Duryee. Jaques & Co., Mr. Treadwell, the expert of the defendants, that is now present.

Re-cross.

X. 131. You have spoken of a hinge, nose, or front-piece, which you stated was at one time placed in front of the front-piece on model A, and attached by a hinge. When was that placed and by whom?

A. It was after the injunction was granted against the defendants, and placed there by the employés of Mr. Jaques. He had two carpenters: I do not know which attached to it.

X. 132. Name the two carpenters.

A. I don't know their names.

X. 133. Give their first names, if you can.

A. I don't know them.

X. 134. Was one of them a German?

A. They were both Germans.

X. 135. Fix the day of the month as near as you can.

A. I cannot give the day nor the month it was in; it was shortly after the injunction.

X. 136. On how many machines was it put?
A. On two, I think.
X. 137. Who worked at those machines while it was on?
A. I believe I am one, and I think John W. Seaver the other.
X. 138. Who worked in the room where these machines were, while this piece was on?
A. I think Mr. Boyden was there, myself, Seaver; and the others I do not remember at present.
X. 139. How long a time was this piece on?
A. It was on till we changed with a hollowed front with a spout.
X. 140. How many days was it on?
A. I cannot mention the number of days; it is an impossibility.
X. 141. Was it on a month?
A. I don't think it was.
X. 142. Was it on a week?
A It was a week or more on, I should think.
121 X. 143. Where both fronts which had the hinge on a week, that is, were these fronts you have been speaking of, with a hinge on John Seaver's machine and your machine, on a week?
A. I cannot state positively, but I should think they were.
X. 144. Were these hinge-fronts ever used afterwards, or before that time?
A. Not to my knowledge.
X. 145. Why was this taken off?
A. For the purpose of putting on the fronts that I have described before with the spout.
X. 146. Was it before or after the first day of January, 1861?
A. I am not certain, but I think after.
X. 147. Was it before or after the first day of February, 1861?
A. I cannot tell.
X. 148. Who was the hardener in the room at the time?
A. I don't recollect the young man's name.
X. 149. Was it Osborne?
A. I think that was his name, but I am not positive.
X. 150. How many hat-bodies were made with this thing on the front of the machine. I mean the hinge-piece on the front?
A. I can't tell how many or about how many.

WILLIAM DYKES.

Subscribed and sworn to before me this 29th August, 1861.

KENNETH G. WHITE,
U. S. Com'r.

Adjourned to the 2d September, 1861, at 2 p. m.

MONDAY, *September 2d*, 1861.

Mr. Gifford, counsel for the complainant, present.

Adjourned to the 4th inst., at 2 p. m.

123 EXHIBIT No. 1.—K. G. W., *U. S. Commissioner.*

Circuit court of the United States, of the district of New Jersey.

HENRY A. BURR, complainant,
against
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE, defendants.

DISTRICT OF NEW JERSEY,
City of Newark, County of Essex, ss:

William Dykes, of the city of Newark, county of Essex, State of New Jersey, being duly sworn, deposeth and saith: Deponent is of age, and has been in the employment of Duryee, Jaques & Co. six months as foreman in the Boyden machine forming-rooms; that there were never run more than two Wells machines at a time, and that on these machines there never was made, to my knowledge, a bat, except for Messrs. Duryee, Jaques & Co.; that all the bodies made for A. T. Finn & Co. and Charles Z. Hedden in the latter part of 1861, and referred to in the affidavits, were formed by the Boyden machines, and not by the Wells machines; and all stock belonging to any other persons than Duryee, Jaques & Co. was under my supervision during the above-mentioned time.

WILLIAM DYKES.

Sworn to and subscribed before me, at Newark, 25th day of March, A. D. 1861.

S. S. MORRIS,
U. S. Commissioner for the N. J. District, in 3d Circuit.

124 EXHIBIT No. 2.—K. G. W., *U. S. Commissioner.*

Circuit court of the United States, district of New Jersey.

BURR
vs.
DURYEE *et al.*

THE SAME
vs.
THE SAME.

William Dykes, being duly sworn, doth depose and say that he is foreman for Messrs. Duryee, Jaques & Co., and has been so for several months past. This deponent has read the affidavits of Israel D. Condit and Daniel Barnum, in the above cases, and also the affidavits of Edward S. and Henry B. Renwick. The said affidavits do not correctly describe the arrangement of parts in the Boyden machines at defendants', and do not properly explain their operation. In the first place, the flexible cloth of defendants' machines is not pressed against the cone by the frame or by rollers. I have tried to work the machines on one or two occasions, and wherever the frame is so arranged as to bring pressure against the cone or bat, the bat is spoiled by

being thrown into welts. There is at least three inches space *between* the cone when it is put into its working position, and *that is as near as the cloth can be pressed to the cone.* In the second place, the said affidavits omit to notice the fact that when the frame is in operation it is secured in place by a catch or latch, and held stationary; otherwise it would not work. This is invariably the case. In the third place, said affidavits omit altogether the description of the beaters.

These are of vital importance. I have tried to work without
125 them, and found the action very slow, and liable to produce bad bats. These beaters have always been used. In the fourth place, the affidavits describe the tubes from the blower, extending to and discharging behind the picker. The tube from the exhaust has never discharged behind the picker, and the machines would not work if it so discharged. It would be of no use in the defendants' machines to discharge the current of air from the blower in the place designated in the said affidavit.

As described in the affidavits of Barnum, Condit, and Renwick, the machines would not work at all; which fact I have verified by careful experiments.

The annexed slip of paper shows the line traveled by every point of the surface of the flexible cloth *while in contact* with the cone. The action is a peculiar one, and seems adapted to a flexible material only.

WILLIAM DYKES.

Sworn and subscribed before me, at Newark, this 27th day of Dec., A. D. 1860.

S. S. MORRIS,
U. S. Commissioner for New Jersey District, 3d Circuit.

A true copy.

PH. DICKERSON, JR., *Clerk.*

126 EXHIBIT No. 3.—K. G. W., *U. S. Commissioner.*

Circuit court of the United States for the district of New Jersey.

HENRY A. BURR
against
PETER S. DURYEE *et als.*

DISTRICT OF NEW JERSEY,
City of Newark, County of Essex, State of New Jersey, ss:

William Dykes, being duly sworn, deposes and says: I am — years of age; reside in Newark, New Jersey; and am engaged in the hat manufactory of Messrs. Duryee, Jaques & Co., defendants, in Newark, as foreman of the forming and hardening room in which the Boyden machines are used. At about the month of August, 1858, I was foreman for Messrs. Geo. E. Cowperthwaite & Co., of Newark, who used the Taylor machine. I remained with them for about a year, or until they gave up business; having sold out, as I understood, to Henry A. Burr, the complainant above named. During this time I

had charge of the said Taylor machines; understood their construction and operation thoroughly. I have read the printed copy attached to the bill of complaint in this suit, of specification of reissue 1030 to H. A. Burr, the complainant, being a reissue of letters patent of the United States, originally granted to Alva B. Taylor for improvement in machinery for making hat-bodies, and bearing date the eighteenth day of March, 1856, and understand the machine described therein, and its mode of operation. I was in the employment of Alva B. Taylor, at Newark, when the machines described in the patent were first set in operation, about the summer of 1856. I knew the construction and operation at that time. They had all the hard
127 ening apparatus described in the patent at that time, viz: the three forming cones, two perforated covers, jigging apparatus and weights, roller, and blast to blow off the bat into the cover. When in the third position on the cone-stand, the bat was hardened partly by jigging the perforated cover by the machine under pressure of the roller, and partly by jigging the cover by hand without pressure. The bats were never hardened to my knowledge entirely by the machine so that they could be removed. On the Taylor machines, at Cowperthwaite and Co.'s, when the bat was formed on the pervious exhausted cone, a perforated cover was immediately placed over the bat, and the bat and forming-cone removed with the cover from the cone-stand, and placed apex downward in a vibrating conical basket, and hardened without being subject to any pressure of the atmosphere. The jigging apparatus, formerly used on the machines at Taylor's, for hardening bats held on the pervious exhausted former by the pressure of the surrounding atmosphere, namely, the weighted roller, the reciprocating motion, the plurality of forming-cones on one cone-stand, was entirely dispensed with, and was not used during the whole time I was at Cowperthwaite's. I have been present at and took part in a number of experiments conducted by F. C. Treadwell, jr., of New York, at different times during this week, at defendants' factory, and on the twelfth instant at Vail's factory, both at Newark.

The object of the experiments was to ascertain whether bats suitable for hat-bodies could be hardened, either by an impervious cover, larger than the bat as described in the reissue 1030 before mentioned, or by sections of such covers. The effect of every attempt to place an impervious conical cover upon the bat was the instantaneous destruction of the bat; it was sucked up into the tips of the cover. The covers used were larger in diameter than the covers on which the bats were formed, varying from one and a half inches larger to four inches larger, and in one case about six inches larger.

In the experiments made with a section of a cover, the bat was not stripped from the cone, because the greater part of the surface was exposed to the open air, which, drawing in at the sides of the section, rolled up welts on the bat which completely ruined it. The
128 same result took place when a flat, smooth, rigid surface was tried, but to a less degree. In the experiments made with the section, and with the flat surface, a rapid reciprocating motion was used, the section and afterwards the sheet of metal being attached to

the reciprocating part of the Boyden framer with the beating action thrown off, not being available for rigid surface.

I also used, by request of Mr. Treadwell, for one whole day, a perforated cloth for hardening, on the Boyden machines; it was the same in all other respects as the cloths used on the Boyden machines; namely, it was an enameled cloth used, with its varnished side next to the bat. The perforations were about as close together as the perforations on the Taylor covers. The result of the day's operation of the perforated cloth was that about half the bats were irreparably damaged; in the hatter's phrase, they were "knock-downs," in hardening, and the balance very inferior. With the impervious cloth we frequently run a whole day on one machine without a "knock-down."

The above-mentioned experiments were finally tried, and every means used to make the things work well if they could.

I cannot give any other reason for the difference in the operation of the impervious metal or rigid surfaces, and of impervious enameled flexible cloth surfaces, than the great natural difference in the two things.

WILLIAM DYKES.

Sworn and subscribed before me, at Newark, this 15th day of December, A. D. 1860.

S. S. MORRIS,
U. S. Commissioner for District of New Jersey, 3d Circuit.

A true copy.

PH. DICKERSON, JR., *Clerk.*

UNITED STATES OF AMERICA.

SOUTHERN DISTRICT OF NEW YORK,
City, County and State of New York, ss:

Be it remembered, that on this fourth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner, duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Wickliff B. Smith, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy, now depending and undetermined in the circuit court of the United States for the district of

New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jacques, and Henry W. Duryee, are defendants in each of said suits.

And the said Wickliff B. Smith, being about the age of thirty-two years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversey aforesaid, I did carefully examine the said Wickliff B. Smith, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Wickliff B. Smith; 32 years of age; reside at Newark, New Jersey; and am employed by Mr. Burr in his hat-body department.

Q. 2. Have you ever worked for the defendants, Duryee,
137 Jaques & Co.; and if yea, when did you commence, and when did you cease to work for them, and at what did you work?

A. I have worked for them, and commenced with them the first of February, 1857, and left off about the first of September, 1860; I worked at hardening hat-bodies.

Q. 3. Did the defendants have any hat-body machines in operation when you worked for them; and if yea, how many, and what kind?

A. They had two; they were called the Burr machines. They were in the basement room, or a room called the basement room on the first floor.

Q. 4. Did they have any more than those two machines for forming hat-bodies while you were with them; and if yea, when did they get the additional ones, and what kind were they?

A. They had one called Mr. Boyden's machine; they got it, I think, in the fall of 1859. On reflection, I think it was the fall of 1858. They had another one called a Mr. Burr machine, that was got in the spring of 1859.

Q. 5. Do you mean that they added another Burr machine to the two they had when you went there?

(Objected to.)

A. They did.

Q. 6. From whom did they procure that third Burr machine?

A. Well, I could not say.

Q. 7. Where did you first see it?

A. In the room called Mr. Boyden's room.

Q. 8. When did you first see it in that room?

A. Well, it was somewhere about the first of April in the spring of 1859.

Q. 9. How do you know whether they procured it at that time, or at some time before then, if you do know?

A. I dont know how long before that they procured that; that was the first I saw of it.

Q. 10. What do you mean, then, in your fourth answer, when you say that an additional Burr machine was got in the spring of 1859?

A. The first I saw of it is what I mean.

131 Q. 11. Was that additional Burr machine put in operation in forming hat-bodies, and if yea, in what room in the factory?

A. It was put in operation in the room called Mr. Boyden's room.

Q. 12. Did you ever see it in operation in that room?

A. Yes, sir.

Q. 13. What was being done with the other two Burr machines, which were in the basement, while this third Burr machine was being operated in the Boyden room?

A. In forming bodies; those machines were in operation downstairs in making bodies.

Q. 14. Explain whether you do or do not mean that all three of the Burr machines were in operation at the same time in forming hat-bodies?

(Objected to.)

A. I mean that all three were running, forming bodies.

Q. 15. State whether at any time hat-bodies came to you to be hardened from the room where the Boyden machine and the Burr machine were placed.

A. Yes, sir; they fetched them in, and I hardened them.

Q. 16. How many, in any one lot, if you remember?

A. Mr. Jaques fetched me about six dozen one day.

Q. 17. What was the condition of the Boyden machine, as to being in running order or otherwise, when Mr. Jaques brought you in that six dozen?

A. Well, they were enlarging the fan-box, or forming-table as you are a mind to call it, for the cone to run on to make a larger body. They had it apart to enlarge it, to make a larger cone on it, to make a larger body.

Q. 18. Was it or was it not in running order?

A. It was not in running order.

Q. 19. Had that six dozen hat-bodies just been formed at the time they were brought into you to harden?

(Objected to.)

A. They were formed or some of them formed that day; they were fetched there; I suppose they were all formed that day.

(Witness's suppositions objected to.)

132 Q. 20. How many Boyden machines, if any, were at the defendants' factory at the time you ceased to work for them?

A. Two.

Q. 21. When you first saw that third Burr machine, and which was in the Boyden room, did it appear to be a new one, or had it been considerably run?

(Objected to.)

A. I think it had been run a good while, from the appearance of it.

Cross-examined by Mr. Harding, defendants' counsel.

X. 22. How often were you in Mr. Boyden's room while these machines were there, which you say you saw there?

A. I was in there three or four times; three times positively.

X. 23. Were both machines running while you were in there?

A. Only Mr. Burr's.

X. 24. Did you never see Mr. Boyden's machine work while you were in that room?

A. I never saw Mr. Boyden's work. I saw Mr. Burr's.

X. 25. Question repeated.

A. I have seen Mr. Boyden's machine work, and I have attended it in that room.

X. 26. When was it that you first saw Mr. Boyden's machine work?

A. I saw it in 1858.

X. 27. How long were you engaged in tending the Boyden machine in that room?

A. Well, I don't think I was engaged more than three or four days at any one time.

X. 28. At what times, and how many times, were you so engaged three or four days in the Boyden room?

A. Well, Mr. Jaques used to come down and request me to come up when he had visitors there. I had been engaged quite a number of times to go up there. I could not state the particular times.

X. 29. How many times were you in that room when you saw what you call the Burr machine there?

A. I was in there three times.

133 X 30. How long each time?

A. Well, I was in once twenty minutes or half an hour; the other times from ten to fifteen minutes.

X. 31. Who was present on those times?

A. Mr. Jaques, Mr. Boyden, Mr. Bauschtlicher, and myself.

X. 32. Who was foreman, having charge of the Boyden room, at this time?

A. I never heard that any body was foreman.

X. 33. Did no one ever tell you that you had no business in that room, or were not wanted there?

A. After I had been there three times.

X. 34. Who told you then?

A. Mr. Till.

X. 35. Was he not the foreman having that room in charge?

A. Mr. Till was called the head foreman; they had a foreman of each department under him.

X. 36. Question repeated.

A. I didn't understand it as being under his charge. Mr. Boyden had charge of it, and it was called Mr. Boyden's room.

X. 37. How many hat-bodies were formed on what you call the Burr machine during the occasion when you staid twenty minutes there?

A. Well, they just run some stock on the machine to show me how it worked. It was running when I went in. Mr. Jaques requested me to come up there to see if the machine couldn't be made to work better. I gave him my ideas of it. There was none formed during that twenty minutes.

X. 38. How many were formed on the second occasion, when you staid ten or fifteen minutes?

A. Well, they were forming one when I went in. I saw them form two more, and I then went to look at some that were formed and laying there, and I then went out of the room.

X. 39. How many were formed on the third occasion when you were present?

A. I was in there three times; the first time I went into
134 the room, Mr. Jacques sent for me to come in, and I went in and put on cards; there was no bodies formed then.

X. 40. What were those ideas you gave?

A. My ideas were to set the cone closer to the brush, and put a board at the bottom to raise up, to make the hat lighter on the edge.

X. 41. Why did you want the cone set nearer to the brush?

A. To form a better tip on the body, and to make the hat more perfect.

X. 42. How was it that setting the cone nearer the brush would tend to produce that effect?

A. Because the brush had more power the shorter distance the stock fell. We had more power down-stairs than up-stairs. The power was better.

X. 43. Why did you suggest an inclined board?

A. To make the hat lighter in the edge.

X. 44. What kind of a body was made on the second occasion when you were there, when you saw what you call the Burr machine, when you made these suggestions?

A. The second occasion, when I was there, they didn't take any off; they called what they were forming medium black cassimeres.

X. 45. Were those formed on that occasion good or bad bodies?

A. I called them very good bodies.

X. 46. Did you not just say that they formed some very handsome bodies while you were there?

A. I said very good.

X. 47. How many?

A. I saw three formed on that occasion while I was there. I saw many that had been formed laying there.

X. 48. How far was the cone from the brush?

A. Well, I never measured it I couldn't say.

X. 49. How far did you advise them to place the cone from the brush?

A. Well, I told them that they had better set it about six inches closer to the brush.

X. 50. If the bodies were good, why did you advise them to set it closer?

135 A. The bodies were not perfect. I wanted it closer to make them better.

X. 51. Give me some idea how far the cone was from the brush while you were there?

A. Well, I should think it was about six feet. It might have been a little more; it was only guesswork.

X. 52. How many bodies which you saw formed in what you call this Burr machine do you know to have been hardened of your own knowledge?

A. I saw two hats hardened while I was in the room.

X. 53. Who hardened them?

A. Mr. John W. Seaver.

X. 54. That is all of the hat-bodies formed in your presence which you saw hardened from that Burr machine?

A. While I was in the room, while it was running, I saw three made and two hardened on that machine.

X. 55. On which of those occasions on which you visited Mr. Boyden's room was it that you saw these two hat-bodies hardened by Mr. Seaver during the ten or fifteen minutes while you were there?

A. That was the third time I was in there, and the last time while the machine was running.

X. 56. Why did you omit to mention Mr. Seaver's name as being present on that occasion when I asked you a few minutes since who were present?

A. Mr. Seaver invited me in there several times to come and see it. Mr. Seaver was attending the machine there. Mr. Seaver was not employed in that room until that machine was running. He attended the machine, got some hats off, a dozen or a dozen and a half, and he then hardened them up.

X. 57. Do you allude to the Burr machine in the Boyden room?

A. Yes, sir.

X. 58. When was it that Mr. Seaver first asked you to come in and see it?

A. Well, I think he asked me to come the next day after it was started.

X. 59. Was that before or after your first, second, or third visit?

136 A. Well, he asked me a number of times to come in, and it was on the third time that I was in the room on his invitation.

X. 60. The first time he asked you to come in, was it before or after the first, second, or third visit?

A. Well, he asked me a number of times before I went in at all.

X. 61. In what month was it that you were present and saw what you call the Burr machine running in the Boyden room?

A. I think it was in April, 1859, the spring of 1859.

X. 62. Was Mr. Till present?

A. No, sir.

X. 63. On no occasion?

A. Not while I was there, when Mr. Burr's machine was in.

X. 64. When was Mr. Burr's machine taken out of Mr. Boyden's room?

A. I don't know when it was taken out.

X. 65. When were you in next and did not see it there?

A. About six months.

X. 66. How long was it there to your knowldge?

A. From the first time that I saw it there to the last time I was in there, I suppose it was ten days.

X. 67. When was this machine brought from where it was set up?

A. I don't know.

X. 68. Did not George Amos do the machinist work on it?

A. I don't know.

X. 69. Was he not present?

A. Not while I was there.

X. 70. Why did you omit to mention Mr. Seaver's name among the list of those who were present?

A. Mr. Seaver was not employed in that room until the machine was in operation.

X. 71. Have you not already shown that he was present on the third visit that you made, and that he then and there hardened two of the three hats which you saw formed?

A. He was there on the third visit, and he asked me in, and I went in the room.

137 X. 72. You say that after you had been there three times, Mr. Till told you that you were not wanted there: where were you when he told you?

A. He was in what they term the stuff-room.

X. 73. Describe particularly this hinged board and its location, that you advised to be placed on this machine, which you call the Burr machine, in the Boyden room?

A. Well, it was a little wider than the machine, run from under the brush down to the cone; the end by the cone raised up or lowered to make the edges lighter—what it was for.

X. 74. Was it put there?

A. Yes, sir.

X. 75. What was between the brush and the cone before that board was placed there?

A. Well, there were steam-pipes placed at the side of the brush, and there were tubes in the pipe about an inch long and about an inch apart.

X. 76. Was there anything else between the cone and the brush?

A. No, sir.

X. 77. When did you first go into Mr. Burr's employ?

A. I went into Mr. Burr's employ in September, 1860.

X. 78. When did you leave Mr. Jaques's, the defendant's, employ?

A. Well, I couldn't state the date. I went from Mr. Jaques one night, and to Mr. Burr the next morning.

X. 79. What wages did you get at Mr. Burr's when you first went there?

A. I work at piece-work there, and made $16, $18, and $19 a week, according to what kind of work I did. Some work I could earn more money on than others.

X. 80. When were you first spoken to about going into Mr. Burr's employ?

A. I was spoken to about nine o'clock in the evening when I left Mr. Jaques, and went with Mr. Burr the next morning.

X. 81. What motive was presented to you which induced you to leave an employer with whom you had been three years so suddenly?

A. There was no motive presented to me.

138 X. 82. Did you make this sudden change of place without any reason?

A. Well, the reason I had for changing was, that when I earned $3 per day I would get pay for it.

X. 83. How much did you get a week at defendant's at the time you left?

A. Nine dollars.

X. 84. Who was it spoke to you about making this change?

A. Mr. George Burnett told me there was a chance for me if I would go down early in the morning; he thought I would get it. He wanted me to come down next morning if I wanted the situation. I went down with him, and Mr. Dodd or Wilcox, the foreman there, set me to work.

X. 85. Is Mr. Burnett in Mr. Burr's employ?

A. He was at that time.

X. 86. What did you say to Mr. Burnett about the machines the defendants used?

A. Well, I don't recollect stating anything to Mr. Burnett about any machine in particular.

X. 87. Had you previously said anything about giving Mr. Burr information to any one?

A. No, sir.

X. 88. What explanation did Mr. Burnett give for coming to see you at Newark?

A. He gave me explanation that there was a chance for me to get work down there; that is all the explanation.

X. 89. You can give no other explanation for the interest he took.

A. Well, all the interest I can give was the good will he had toward me; that is all I know.

X. 90. Who was the first person to whom you communicated the number of what you call Burr machines, what the defendants used?

A. Mr. William Dodd.

X. 91. When was this?

A. This spring.

X. 92. About what time in the spring, and on what occasion?

A. Well, I think it was about the first of March, or in Feb-
139 ruary, that Mr. Dodd came to my house and asked me about it.

X. 93. Have you not spoken to employés of the defendants, requesting them to testify that the defendants run three Burr machines?

A. No, sir.

X. 94. Have you never told employés of defendants that they could make some money by going into the employ of Mr. Burr?

A. No, sir.

X. 95. Did you never so tell Patrick Burns?

A. No, sir.

X. 96. Did you not go to a lager-beer store in Newark, along with Mr. Dodd and Bauschtlicher, on one occasion, and meet Dennis Lalor there?

A. No, sir.

X. 97. What was the actual number of hat-bodies formed on the Burr machine, so-called by you, in Mr. Boyden's room, to which you can testify of your own knowledge?

A. Three.

X. 98. Can you, of your own knowledge, state what was the condition or construction of what you call the Burr machine, in all its

parts, at any other time than when you were present in the room; I mean the so-called Burr machine, in Boyden's room?

A. I could not tell how it was when I didn't see it.

WICKLIFF B. SMITH.

Direct resumed by Mr. Gifford.

Q. 99. Who has the name of paying workmen the best wages, Mr. Burr or the defendants?

(Objected to.)

A. Mr. Burr.

Q. 100. Did you work by the day or by the piece, or how, for the defendants.

A. I worked by the week, at $9 a week.

Q. 101. State whether there is a general anxiety among workmen to work for Mr. Burr, if they can find an opening in his establishment for them?

A. Yes, sir.

140 *Cross resumed by Mr. Harding.*

X. 102. What did you mean when you said the defendants did not pay you what you earned?

(Objected to, as the witness did not use such language.)

A. I did not say they did not pay me what I earned.

X. 103. Did you not mean to convey the idea in one of your answers that for the same amount of work you done for Mr. Burr that you did for defendants, per week, that you would be much better paid by Burr?

A. I worked for Mr. Burr by the piece, and I got all I earned; and I worked for Mr. Jaques, and I only got twelve shillings for my day's work—for the same amount of work that I would get twelve shillings from Mr. Jaques. I would get from Mr. Burr—I would get in the neighborhood of three dollars, sometimes more and sometimes less. The day's work varied very much.

WICKLIFF B. SMITH.

Subscribed and sworn to before me this 4th day of September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Adjourned to 5th September, at 10 a. m.

141 UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this fifth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the

more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call, and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Gabriel Decker, to testify and the truth to say, on the part and behalf of the complainant in a certain suit or matter of controversy, now depending and undetermined, in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits.

And the said Gabriel Decker, being about the age of fifty-eight years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Gabriel Decker, and he did thereupon depose, testify, and say, as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Gabriel Decker; fifty-eight years of age; reside at Newark, New Jersey, and am engaged on machinery, and fitting up hat-shop for Mr. Burr.

Q. 2. When did you commence to work for Mr. Burr the
142 first time, and how long did you then continue to work for him, and at what?

A. As near as I can recollect, between eleven and twelve years ago, and continued to work for him up to this last May, a year ago, at making hat-machines, and blowers, and patterns, and all such things; I am a carpenter by trade.

Q. 3. Why did you leave Mr. Burr last May, a year ago?

A. I went home to Newark to build an addition to my house.

Q. 4. Have you worked for the defendants, Duryee, Jaques & Co.; and if yea, when did you commence, and when did you cease to work for them, and at what did you work?

A. I have; I commenced with them the latter part of last July, a year ago, and quit there the latter part of last March; I worked for them at building machinery and blowers.

Q. 5. Did you see hat-body machines in the establishment of defendants; and if yea, how many, and where were they placed?

A. I have seen two down in their basement, and have seen three up on their second or third story, I won't be sure which. These were forming machines, that were running, that I have reference to.

Q. 6. Well, did you see any which were not running; and if yea, how many, and where?

A. Yes, sir, I saw one; it was up in the top story, the same floor on which I worked.

Q. 7. In what condition was that one in the top story?

A. It was packed away there, in one corner of the building, under old rubbish; it was taken apart and stowed away there.

Q. 8. Was that one machine a new one or an old one?

A. It was a machine that had been running. It looked to me as if it had been running some little time; I didn't take particular notice.

Q. 9. Are you acquainted with the kind, and particular style of the hat-body machine, which the complainant, Mr. Burr, has made?

(Objected to.)

A. Yes, sir.

143 Q. 10. Was that one machine, which you say was packed away in the top story, Mr. Burr's make?

(Objected to.)

A. No, sir; not unless it was made before I went to work for him.

Q. 11. Were there any machines in operation by Mr. Burr, when you went to work for him, of the same make as that one in the top story?

(Objected to.)

A. No, sir.

Q. 12. What were those machines called which were in operation in the basement of the defendants' establishment?

A. They were called hat-forming machines.

Q. 13. How were they distinguished by name from the other three, which were running there in the second or third story?

A. Those in the basement we always called the Burr machine, and the other the Boyden.

Q. 14. Were those two running in the basement Mr. Burr's make?

(Objected to.)

A. The one was; I don't know whose make the other was, but it was not Mr. Burr's make, unless it was built before I went to work for him. I never saw any such machine after I went to work for him.

Q. 15. Did you ever see any one of that make before you went to work for Mr. Burr?

A. No, sir.

Q. 16. Was the one which was stowed away in the top story of defendants' establishment, of the same make as either of those running in the basement; and if it was, then which one was it like?

(Objected to.)

A. Yes, sir; it was like the one which I call the one "not like Mr. Burr's make."

Q. 17. Did you, at any time while at work for defendants, talk of constructing and starting hat-body machines on your own account?

(Objected to.)

A. Yes, sir; there was some little talk about it

144 Q. 18. Did you talk with one of the defendants, Mr. Jaques, upon that subject?

(Objected to.)

A. I did.

Q. 19. State whether Mr. Jaques encouraged you or discouraged you in going into that business.

(Objected to.)

A. He told me it was a very good business. He told me it was a

very good business if I was a mind to go into it. He told me that he and Mr. Burr were at law about these hat-machines; and he told me that if Mr. Burr should happen to beat him, and take the machine away from him, he would give me all his work.

Q. 20. State whether he offered to lend you patterns to construct machines from.

(Objected to.)

A. He offered them to me after I asked him to lend them.

Q. 21. Did he lend you any patterns for that purpose?

(Objected to.)

A. He told me I might have them to get castings from them. He said I could take them, and I took them.

Q. 22. Did you return them to him, or to the defendants' place, afterward?

A. I returned them back to the shop where I got them.

Cross-examined by Mr. Harding, defendants' counsel.

X. 23. On what kind of machines did you work for Mr. Jaques while you were with defendants?

A. Working at blowers and mixing-machine.

X. 24. What is the blower used for?

A. To blow the stock and prepare it for hat-bodies.

X. 25. Is not the blower a large machine used at defendants' for separating and cleaning the fur before it is taken into the room where the forming machines are?

A. Yes, sir.

X. 26. Did Mr. Jaques ever lend you, or did you ever borrow from him, the pattern of a hat-forming machine?

A. Yes, sir; part of it.

X. 27. What part of it did you ever borrow?

145 A. I borrowed the pattern of a fan and cross-bar, and the bearing of a brush, and the front bearing of a fan-box.

X. 28. What kind of a hat-forming machine did you propose to get up?

A. Something like Mr. Burr's.

X. 29. How was it to differ from Mr. Burr's?

A. The fan was a little different, and I was going to use a picker instead of a brush.

X. 30. When was it you proposed to do this?

A. Along in last winter, after the holidays; in the early part of the year 1861.

X. 31. What other difference did you propose to make?

A. We were going to make them a little different in the partition next to the fan.

X. 32. Who do you mean by "we?"

A. I don't know that I mean any one in particular. Me, if that is a proper way of saying it.

X. 33. Did you propose to place a trunk in that machine?

A. Yes, sir.

X. 34. Why did you not build a machine?

A. Well, I gave it up; when the hard times came on I couldn't do anything with it.

X. 35. How far did you proceed with the building of it?

A. I didn't do anything; only got a few castings.

X. 36. Where were you while this was going on; in whose employ—I mean the building of the machine?

A. I was employed by Mr. Jaques at the time it was talked of; I didn't build any for myself.

X. 37. Did you ever build a hat-body machine for the defendants?

A. I never built any machine out and out; I built some improvements to a machine.

X. 38. What improvements?

A. I made a fan-box, and a conductor, and a picker.

X. 39. Just describe this conductor.

A. It was the same as Mr. Burr's, only shorter.

X. 40. What was done with these improvements which you built?

A. They were there at Mr. Jaques's; that is, when I left.

146 X. 41. On which of the machines was this improvement made?

A. On one of the Burr machines in the basement.

X. 42. Is that all the work you did on the hat-body machines?

A. That is all; I made two fan-boxes, one conductor, and one picker.

X. 43. All this was done on the machines in the basement?

A. That is what they were intended for; that is as near as I recollect.

X. 44. And you borrowed the pattern of an improved fan, and the cross-bar, which supports the fan in the fan-box, and the bearing which supports the picker; is that all?

A. The front bearing of the fan-box.

X. 45. Was this an improved fan?

A. Yes, sir.

X 46. Who made this improvement in the fan of which you wished to borrow a pattern of?

A. I and Mr. Hardee.

X. 47. Did you make the pattern of this improved fan?

A. No, sir, I did not make the pattern of that fan.

X. 48. Did you ever see more than two Burr machines in operation at defendant's factory, while you were there?

A. No, sir, not what they call the Burr machine.

X 49. Was not the third machine, which you have called a Burr machine, parts of a machine which had been stowed away up in the rubbish-room?

A. They called it a Burr machine; it was the same as the one in the basement.

X 50. Was it not in a rubbish-room among the rubbish that you saw this?

A. Yes, sir; it was in one corner of the building.

X. 51. Did you not suppose that the plan of your machine which you proposed to get up was an original plan of your own?

A. I was going to build a machine similar to Mr. Burr's. I was going to put a little improvement to it.

X. 52. How did you expect to use a machine like Mr. Burr's after you had built it?

147 A. I expected to use it, like some others, on the sly.

X. 53. Did you consider this honorable to your former employer, Mr. Burr?

A. I knowed it wasn't exactly right, but, as the man said, every one for himself.

X. 54. When did you go back to work for Mr. Burr?

A. Along the first of April, 1861.

X. 55. When did you leave the defendants?

A. I think it was along in the last of March, as near as I can recollect.

X. 56. What did you do after you left defendants' employ?

A. I went home, and done some repairing for myself, around my yard, fixing up my fence, etc.

X. 57. Whom did you employ to make your castings?

A. Hughes & Philips. There is some other patterns I borrowed, belonging to a fur blowing machine, which I did'nt think of when I spoke. These had nothing to do with the hat-forming machine. I had castings made of these patterns of the fur-blowing machines at the same place.

X. 58. Who paid the expenses of these castings?

A. I did.

X. 59. Who made the drawing of the machine which you were about to build?

(Objected to by counsel for complainant, because it assumes that drawings were made, when no such fact has been proved.)

A. Which machine do you mean?

X. 60. The hat-body machine.

A. There was no drawing made.

X. 61. When did you tell Mr. Burr, or any one in his employ, that you had proposed to run a machine on your own account for forming hat-bodies?

A. I never told Mr. Burr anything about it, nor I don't recollect of telling any of his men in his employ.

X. 62. Well, when did you mention it to any one?

A. I never mentioned it to any one, except when the question was put to me, except Wm. Dykes. I mentioned it to him along

148 the latter part of the winter. Come to recollect, I have talked to Mr. Hardee about it.

GABRIEL DECKER.

Subscribed and sworn to before me this 5th day of September, 1861

R. E. STILWELL,
U. S. Commissioner.

UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this fifth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call, and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Richard Fitzgerald, to testify and the truth to say, on the part and behalf of the complainant, in a certain suit or matter of controversy, now depending and undetermined, in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits.

And the said Richard Fitzgerald, being about the age of 62 years,
149 and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Richard Fitzgerald, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence and occupation?

A. Richard Fitzgerald; sixty-two years of age; reside in Newark, New Jersey, and am a machinist.

Q. 2. Did you ever work for the defendants, Duryee, Jaques, & Co.; and if you did, when did you commence to work for them, and when did you cease to work for them?

A. I did; I commenced to work for them in 1850; I think it might have reached a little further back, and ceased to work for them in the latter part of April, 1851; that is as near as I can come at.

Q. 3. What kind of work did you do for them during that period?

A. General machinery work.

Q. 4. When you commenced to work for them, had they in operation any hat-body machines, and how many, and what kind of machines were they?

A. They had two hat-body machines; they called them forming machines.

Q. 5. Do you know where those two machines came from, or who made them, or did you ever hear Mr. Jaques say?

A. Yes; I heard him say that they bought them from Mr. Burr; Burr, Taylor, & Co., I think it was.

Q. 6. Did you build, or aid in building, a hat-body machine while you were at work for the defendants, during the time you have stated; and if you did, by whose direction did you build it, and like what other machine was it?

A. I did; it was built by the direction of Henry H. Jaques, and to be built like those two running there.

Q. 7. Did you put the machine in operation, or aid in doing so after it was finished?

A. I did attempt to do it; it did not work very well; I think it was thrown aside.

Q. 8. What became of it, or was anything else done to it to make it work better?

150 A. I left them soon after that; some other mechanics might have modeled it over; I do not know.

Q. 9. Why did it not work well; what appeared to be the difficulty?

A. It did not get a very good, strong exhaust, to exhaust the air from the cone; it was not strong enough.

Q. 10. What was the difficulty owing to?

A. Owing to the fan not being made right.

Q 11. In what room, or part of the establishment, did you set it up, and attempt to put it in operation?

A. It was in a cellar apartment; it was in the same room where the other two machines were running.

Cross-examined by Mr. Harding, defendants' counsel.

X. 12. Was not this machine, which you built, intended as a substitute for one of the two Burr machines in the room?

A. Yes.

X 13. Was not the Burr machine, for which it was intended to substitute the machine which you built, doing bad work?

A. This machine was built to put in the place of one of the other ones when they were out of order.

X. 14. Was not the big Burr machine, which was in the room, constantly getting out of order?

A. Yes; they are all subject to that.

X. 15. Was there ever, to your knowledge, more than two Burr machines run at one time?

A. I never knowed that there was.

Redirect.

Q. 16. In what way was the big Burr machine getting out of order?

A. It got out of order in different parts; mostly from the wearing out of the journals and boxes, as they run very swift.

RICHARD FITZGERALD.

Subscribed and sworn to before me this 5th day of September, 1861.

R. E. STILWELL,
U. S. Commissioner.

151 UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this fifth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled 'An act to establish the judicial courts of the United States," passed September 24th, 1789, did call, and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Francis Gokan, to testify and the truth to say, on the part and behalf of the complainant, in a certain suit or matter of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said Francis Gokan, being about the age of thirty-seven years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Francis Gokan, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Francis Gokan; thirty-seven years of age; residence, Newark, New Jersey; I have been working for my father-in-law, Mr. Acoste, in the hatting business; I am not a hatter, but I attend to the outside business; the business is making and selling soft hats.

152 Q. 2. State whether your father-in-law has had hat-bodies formed by the defendants, Duryee, Jaques & Co., and when and what quantity?

A. Last spring: I could not state particularly; about two hundred and forty bodies; I cannot state particularly; a few more or less.

Q. 3. Who found the stock or fur out of which these hat-bodies were formed?

A. Mr. Acoste.

Cross-examined by Mr. Harding, counsel for defendants.

X. 4. Did you bring the bill and receipt for this work?

A. I can bring the receipt, perhaps the bill, too; I'll look for it.

FRANCIS GOKAN.

Subscribed and sworn to before me this fifth day of September, 1861.

R. E. STILWELL,
U. S. Commissioner.

A. Yes; I heard him say that they bought them from Mr. Burr; Burr, Taylor, & Co., I think it was.

Q. 6. Did you build, or aid in building, a hat-body machine while you were at work for the defendants, during the time you have stated; and if you did, by whose direction did you build it, and like what other machine was it?

A. I did; it was built by the direction of Henry H. Jaques, and to be built like those two running there.

Q. 7. Did you put the machine in operation, or aid in doing so after it was finished?

A. I did attempt to do it; it did not work very well; I think it was thrown aside.

Q. 8. What became of it, or was anything else done to it to make it work better?

150 A. I left them soon after that; some other mechanics might have modeled it over; I do not know.

Q. 9. Why did it not work well; what appeared to be the difficulty?

A. It did not get a very good, strong exhaust, to exhaust the air from the cone; it was not strong enough.

Q. 10. What was the difficulty owing to?

A. Owing to the fan not being made right.

Q 11. In what room, or part of the establishment, did you set it up, and attempt to put it in operation?

A. It was in a cellar apartment; it was in the same room where the other two machines were running.

Cross-examined by Mr. Harding, defendants' counsel.

X. 12. Was not this machine, which you built, intended as a substitute for one of the two Burr machines in the room?

A. Yes.

X 13. Was not the Burr machine, for which it was intended to substitute the machine which you built, doing bad work?

A. This machine was built to put in the place of one of the other ones when they were out of order.

X. 14. Was not the big Burr machine, which was in the room, constantly getting out of order?

A. Yes; they are all subject to that.

X. 15. Was there ever, to your knowledge, more than two Burr machines run at one time?

A. I never knowed that there was.

Redirect.

Q. 16. In what way was the big Burr machine getting out of order?

A. It got out of order in different parts; mostly from the wearing out of the journals and boxes, as they run very swift.

RICHARD FITZGERALD.

Subscribed and sworn to before me this 5th day of September, 1861.

R. E. STILWELL,
U. S. Commissioner.

151 UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this fifth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled 'An act to establish the judicial courts of the United States," passed September 24th, 1789, did call, and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Francis Gokan, to testify and the truth to say, on the part and behalf of the complainant, in a certain suit or matter of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said Francis Gokan, being about the age of thirty-seven years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Francis Gokan, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Francis Gokan; thirty-seven years of age; residence, Newark, New Jersey; I have been working for my father-in-law, Mr. Acoste, in the hatting business; I am not a hatter, but I attend to the outside business; the business is making and selling soft hats.

152 Q. 2. State whether your father-in-law has had hat-bodies formed by the defendants, Duryee, Jaques & Co., and when and what quantity?

A. Last spring: I could not state particularly; about two hundred and forty bodies; I cannot state particularly; a few more or less.

Q. 3. Who found the stock or fur out of which these hat-bodies were formed?

A. Mr. Acoste.

Cross-examined by Mr. Harding, counsel for defendants.

X. 4. Did you bring the bill and receipt for this work?

A. I can bring the receipt, perhaps the bill, too; I'll look for it.

FRANCIS GOKAN.

Subscribed and sworn to before me this fifth day of September, 1861.

R. E. STILWELL,
U. S. Commissioner.

UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this 5th day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call,
153 and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, William Desendorf, to testify and the truth to say, on the part and behalf of the complainant, in a certain suit or matter of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said William Desendorf, being about the age of thirty-five years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said William Desendorf, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. William Desendorf; age, thirty-five; reside, No. 136 Henry street, New York city; by occupation, hatter; I make and sell hats.

Q. 2. Do you procure your hat-bodies to be made by machines?

A. Yes, sir.

Q. 3. Have you ever had any made by the defendants, Duryee, Jaques & Co.? when, how many, and who found the stock or fur?

A. I have sent stocks there to be formed, but never have seen them formed, but the hat-bodies were returned; the number is 3,168; between October 1st, inclusive, and May, 1861.

WM. DESENDORF.

Subscribed and sworn to before me this 5th day of September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Adjourned to the 11th inst., at 10 a. m.

155 No. 4472.

The United States of America to all to whom these letters patent shall come:

Whereas Henry A. Wells, of New York, has alleged that he has invented a new and useful improvement in machinery for making hat-bodies, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Henry A. Wells, his heirs, administrators and assigns, for the term of fourteen years, from the twenty-fifth day of April, one thousand eight hundred and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to other to be used, the said improvement, a description whereof is given in the words of the said Henry A. Wells, in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed. Given under my hand at the city of Washington, this twenty-
[SEAL.] fifth day of April, in the year of our Lord one thousand eight hundred and forty-six, and of the independence of the United States of America the seventieth.

JAMES BUCHANAN,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.

EDMUND BURKE,
Commissioner of Patents.

156 *The schedule referred to in these letters patent and making part of the same.*

To all to whom these presents shall come:

Be it known that I, Henry A. Wells, of the city, county, and State of New York, have invented new and useful improvements in the process of, and machinery for, making hat-bodies, etc., and that the following is a full, clear, and exact description of the principle or character thereof, which distinguishes them from all other things before known, and of the manner of making, constructing, and using the same. Reference being had to the accompanying drawings making part of this description, in which figure 1 is the plan of the machine, figure 2 a longitudinal vertical section, and figure 3 a longitudinal elevation. The other figures will be described in their appropriate places.

The same letters indicate like parts in all the figures.

It has long been essayed to make hat-bodies by throwing the fibres of fur, wool, etc., by a brush or picker cylinder, into a perforated cone, exhausted by a fan below to carry and hold the fibres thereon by the currents of air that rush from all directions towards and through the apertures of the cone, and thus form a bat of fibres ready for hardening and felting, but from various causes all these attempts have failed. I have, however, so improved this machine in various important particulars as to remove all the objections, as proved by the test of experiment. My improvements consist in feeding the fur, (called the stock,) after it has been picked, to a rotating brush, between two endless belts of cloth, one above the other, the lower one horizontal, and the upper inclined, to gradually compress the fur, and gripe it more effectually where it is presented to the action of the rotating brush, which, moving at a great velocity, throws it in a chamber, or tunnel, which is gradually changed in form, towards the outlet, where it assumes a shape nearly corresponding to a vertical section passing through the axis of the cone, but narrower, for the purpose of concentrating and directing the fur thrown by the brush into the cone; this casing being provided with an aperture immediately under the brush, through which a current of air enters,
157 in consequence of the rotation of the brush, and the exhaustion of the cone, for the purpose of more effectually directing the fibres towards the cone, which is placed just in front of the delivery aperture of the chamber, or tunnel, which aperture is provided at top with a bonnet or hood, hinged thereto, and at the bottom with a hinged flap to regulate the deposits of the fibres on the cone or other former, with the view to distribute the thickness of the bat wherever more is required to give additional strength. As the fibres are only held to and on the cone by the pressure of the surrounding air, in consequence of the exhaustion of the cone or former, preparatory to the suspension of this pressure, some means must be adopted of holding and retaining the fibres composing the bat, and it is obvious that this delicate web, thus formed, has not sufficient tenacity to admit of removing it from the cone or former before the hardening process; and therefore my invention also consists in covering the bat, before it is removed from the cone or former, with felted or fulled cloth, and then employing one or two perforated metallic cones, one to put over the bat after it has been surrounded with the moist felt or cloth, for the purpose of making pressure on the fibres, and to admit of the circulation of hot water, when the whole is immersed therein, to harden the bat preparatory to felting, and the other to be placed within the perforated metallic cone on which the hat has been formed, and which is necessarily thin and weak, for the purpose of resisting the pressure of the surrounding water, consequent upon a partial vacuum produced within, when the whole is withdrawn from the water.

In the accompanying drawings, (*a*) is a frame properly adapted to the operative parts of the machine, and (*b*) the lower feed-apron on which the stock is spread by the attendant, in separate parcels, each sufficient for the formation of a hat, according to its intended weight. This apron, or endless belt of cloth, or other suitable material, passes around a roller (*c*) and a lip (*d*), the former at the back of the ma-

chine, with its bearings in sliding boxes governed by set screws (*ee*) for the purpose of tightening the apron, and the latter near to the rotating brush (*f*), and so formed as to present a slightly rounded edge for the apron to pass over, where it presents the fur to the action of the brush. Instead of this slightly rounded edge, a small
158 metallic roller may be substituted; but when this is done the roller should be supported at different points between its end journals; and this I have effected by letting it run in a circular groove in the lip, as represented in section at figure 4, where (*g*) indicates this roller. The fur, as it is carried along towards the lip (*d*), is gradually compressed by the upper apron (*b'*), which passes around a feed-roller (*c'*) and lip (*d'*) in manner similar to the under feed-apron. The roller (*c'*) runs in a frame (*i*), (of which the lip (*d'*) forms part), hung on journals that rest in standards (*j*), so that the lip (*d'*) can be made to press on to the fur between it and the under lip (*d*), and thus gripe the fibres and present them to the effective action of the brush (*f*). The under plane of the upper apron (*b'*) is inclined to the upper plane of the lower one (*b*), the more effectually to present the fibres in a proper manner to the brush.

The roller (*c'*) of the upper apron runs in sliding boxes governed by set screws (*e'e'*), and is placed forward of the journals of the frame, so that the tension of the belt (i^2), which communicates motion from the lower roller (*c*) to the upper one (*c'*), may press the upper lip (*d'*) on the under lip (*d*); but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure under similar circumstances.

The fibres, as they pass from the feed-aprons, are acted upon by a brush (*f*) that rotates with great velocity, and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed, if desired. As the fibres are first presented they are brushed and properly laid by the downward action of the brush, as indicated by the arrow, and when liberated are carried down the curved surface (*l'*) of a chamber or tunnel (*m*), and at the lower edge of this they meet a current of air (that enters a narrow aperture (*n*) near the bottom of the chamber, and extending the whole length of the brush,) which being induced by the rotation of the brush and the partial vacuum in the perforated cone, prevents the fibres of fur from falling and resting on the bottom of the chamber, and carries them on to the perforated cone (*o*). This chamber extends over and under the brush and the forward
159 part of the lips, turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush; its bottom rests on a set screw (*p*) to regulate the delivery end of the chamber relatively to the cone; its forward end, in addition to this, is provided with a hinged flap (*q*) regulated by a cam lever, as a means of regulating the delivery of the fibres; its top (*r*) is gradually elevated, and sides contracted to make the delivery aperture nearly of the form of the cone, but narrower and higher, and its upper part is provided with a hood (*s*) so curved as to correspond generally with the curve of the top of the cone. This hood is hinged to the upper part of the delivery aperture of the

chamber, and is connected with an eccentric (t) by means of a cord (u) and bell-crank (u') that passes over a pulley (r), so that each revolution of this eccentric carries the hood up and down to direct the discharge and distribute the fibres on to the cone, a greater thickness being desirable in the parts of the bat which form the brim and edge, or square of the top, than on the top and crown; and when it is desired still further to diversify the distribution of the fibres, a cam can be substituted for the eccentric, and the connection between it and the hood is formed (as represented in section at figure 5) where the cam (t) acts on a lever (t') connected with the hood (s) by the cord (u).

The cone (o) is made in the usual manner, but of thin sheet metal, perforated, instead of wire gauze; its lower edge fits in a metallic ring (w) that runs in an appropriate collar in the upper part of a case, (x), and its outer periphery is provided with cogs that mash into the cogs of a pinion, (y), concealed in the drawing by the pulley (d^2) on a vertical shaft, (z), by which a slow rotary motion is given to the cone, as the fibres are thrown on to it, to distribute them equally all around the cone. The case (x) is sufficiently long to receive two rings, (w,) one on each side of the pinion (y) by which both are kept in motion, and it (the case) is made to swivel on a hollow collar (f') to which its bottom is fitted, so that when one cone is covered, it may be turned aside by turning the case half a revolution, and another cone put on to the other ring, and another bat may be in the process of forming whilst the one already formed may be prepared for the hardening process, in the manner to be hereafter described.

The case (x) communicates through the hollow collar (f') with an exhausting fan-blower (y) which consists of a vertical arbor (h) with oblique vanes, (i), so that when rotating with great velocity, in the direction of the arrow, the air is exhausted from the case (x) and the perforated cone (o). When one of the cones is removed from one of the rings (w) to be taken to the hardening apparatus, the aperture in the ring (w) must be closed up with a cap plate (w^2) to prevent the access of air. Any other mode of exhausting the case and cone may be employed, but this is the most efficient which I have essayed.

The preparation of the formed bat for hardening is effected by covering it with pieces of felt or fulled cloth just taken from hot water, which is done in the following manner, viz.: The attendant takes from a kettle of hot water a piece of felt cloth rolled up on a roller, and applies one end of it to the surface of the bat, and as the cone rotates, the felt cloth winds from the roller on to the bat on the cone, another piece of felt cloth is put on the top, and then a strong perforated metallic cone (k') (see figure 6) is put over the whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them whilst it is immersed in hot water to harden. As the perforated cone (o) is better when made very thin, the pressure of the water, when drawing it out of the kettle, after the bat has been hardened, tends to and would collapse it, and therefore to prevent this, I employ another perforated metallic cone (l') (see figure 7) which is put inside (before the whole is immersed in hot water) to sustain the pressure in drawing the whole out of the hardening kettle. The relative situation of the three cones, the bat and the covering

felt cloth, preparatory to the hardening process, is represented on an enlarged scale at figure 8, which is a vertical section through the whole. The inner sustaining cone may be dispensed with if desired, by making the cone (*o*) of greater thickness and strength.

161 All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying drawing, in which (*m*) is a main-line shaft, overhead, driven by any first mover from a wheel (*n'*); on it a band (*o'*) extends to a pulley (*p'*) on the shaft of the brush, which should make about two thousand revolutions per minute, more or less. From another wheel (*q'*) on this same shaft, a band (*r'*) extends to a pulley, (*s'*), on the shaft of which there is a wheel (*t'*) which drives the exhaust-pan (*g'*) by the belt (*u*).

And from a pulley (*v'*) on the same line shaft, a belt extends to a wheel (*w'*) on the shaft of which there is a pulley (*x'*) from which extends another belt (*y'*) to a wheel (*z'*) on the shaft (a^2) that carries the eccentric (*t*) to give all the reduced motions required for the other parts of the machinery. From a wheel (b^2) on this shaft a belt (c^2) extends to a pulley (d^2) on the shaft (*z*) that rotates the cone (*o*). And another pulley (e^2) drives the wheel (f^2) of the feed-roller (*c*) by the belt (g^2), and on the other end of the axle of this feed-roller there is a pulley (h^2) which drives by a cross-belt (i^2) the upper feed-roller (*c'*). If desired, an alarm can be connected with the feed-roller of the lower apron to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arbor of the feed-roller (*c'*) of the lower feed-apron by a belt with a wheel (k^2) provided with a cam or pin to lift at every revolution the hammer (l^2) of a bell (m^2), the striking of which shall give requisite indication.

It will be obvious, from the foregoing, that the hood may be operated by hand instead of machinery, thus substituting the attention, skill, and cost of an operative for the positive regularity and cheapness of mechanical movements; but such a change, whilst it gives less perfect and advantageous results, still involves one of the essential parts of my invention. It may be well to add, as a mere matter of precaution, that this invention is not limited to the making of hat-bodies, but to the making of bats on formers of any other shape or configuration, the form of the delivery aperture of the chamber, and the hood and the movements of the latter being properly adapted to the change of form of the mould or former, with the restrictions indicated.

162 What I claim as my invention, and desire to secure by letters patent in the machinery above described, is the arrangement of the two feeding-belts, with their planes inclined to each other, and passing around the lips formed substantially as described, the better to present the fibres to the action of the rotating brush as described in combination with the rotating brush and tunnel or chamber which conducts the fibres to the perforated cone or other former placed in front of the aperture or mouth thereof, substantially as herein described. I claim the chamber into which the fibres are thrown by the brush, in combination with the perforated cone or other former, placed in front of the delivery aperture thereof, for the pur-

pose and in the manner substantially as herein described, the said chamber being provided with an aperture below and back of the brush, for the admission of a current of air to aid in throwing and directing the fibres on to the cone or other former, as described. I also claim the employment of the hinged hood, to regulate the distribution of the fibres on the perforated cone or other former as described. And I also claim providing the lower part or delivery aperture of the tunnel or chamber with a hinged flap, for the purpose of regulating the delivery of the fibres to increase the thickness of the bat where more strength is required, as herein described, in combination with the hood, as herein described. And in the process I claim hardening the bat whilst on the perforated cone or former, and preparatory to its removal therefrom, by immersing it in hot water, as herein described. I also claim covering the bat with felted or fulled cloth before it is removed from the cone or former, as described.

And finally I claim the employment in combination of both of the perforated cones, one for making pressure on and retaining the fibres of the bat until hardened, and the other to prevent the collapse of the cone or other former on which the bat is formed, substantially as herein described.

H. A. WELLS.

Witnesses:
CHARLES M. KELLER.
A. P. BROWN.

163 Re-issue, No. 396.

The United States of America to all to whom these letters patent shall come:

Whereas, Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, of New York, N. Y., assignees of Henry A. Wells, deceased, have alleged that said Wells did, in his lifetime, invent a new and useful improvement in machinery for making hat-bodies, (for which letters patent were issued to said Wells dated 25th April, 1846, which letters having been surrendered by said assignees, the same have been cancelled, and new letters ordered to issue to them on an amended specification,) which said Wells stated had not been known or used before his application, he having made oath that he was a citizen of the United States; that he did verily believe that he was the original and first inventor or discoverer of the said improvement, and that the same had not, to the best of his knowledge and belief, been previously known or used; said assignees having paid into the treasury of the United States the sum of fifteen dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, their heirs, administrators, or assigns, for the term of fourteen years from the said twenty-fifth day of April, one thousand eight hundred

and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said assignees in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto
164 [L. S.] affixed. Given under my hand at the city of Washington this thirtieth day of September, in the year of our Lord one thousand eight hundred and fifty-six, and of the independence of the United States of America the eighty-first.

GEO. C. WHITING,
Acting Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

C. MASON, *Commissioner of Patents.*

The schedule referred to in these letters patent and making part of the same.

To all whom it may concern:

Be it known that Henry A. Welles, late of the city, county, and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in the process of and machinery for making hat-bodies of fur, for which said improvements letters patent of the United States were granted to the said Wells, bearing date the 25th day of April, 1846, of which the following is a full, clear and exact description of the principle or character which distinguishes the said invention from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings making part of this description, in which figure 1 is a plan of the machine; figure 2 a longitudinal, vertical section, and figure 3 a longitudinal elevation. The other figures will be described in their appropriate places. The same letters indicate like parts in all the figures.

It has long been essayed to make hat-bodies by throwing the fibres of fur, wool, etc., by a brush or picker cylinder on to a perforated cone, exhausted by a fan below, to carry and hold the fibres thereon by the currents of air that rush from all directions towards and through the apertures of the cone and thus form a bat of fibres ready for hardening and felting; but from various causes all these attempts
165 have failed. Hat-bodies are required to be made thick at and near the rim, and thin along the crown and tip, that the required strength may be given where it is required, without making the hat too heavy, and at too great a cost of material. This disposition of the fur can be obtained by the skill and judgment of the workman by the hand process, known under the name of "bowing," but cannot by the plan above referred to, for the reason that the fibres are only controlled by the currents induced through the apertures of the cone, or other form, by the exhaust instead of being thrown and properly directed for distribution, on to the cone or other form. When the fibres are not properly thrown and directed, but are drawn to the surface by the action of the exhaust, the force thus induced

gradually decreases as the apertures in the cone are closed up by the accumulation of the fur deposited on the outer surface thereof, and in consequence the impelling force, which carries the fibres, becomes insufficient to control the force of gravity, which will then prevail and cause the fibres to accumulate to a greater thickness on the tip of the cone where much less is required than below. And the said suggested plan cannot produce a practical result, for the further reason there is no mode described by which the bat of fur fibres can be hardened while on the cone, that it may be removed from such cone preparatory to the after and well known process of sizing or felting.

The invention of the said Henry A. Wells, by which the required and much-desired practical result was obtained, consists in forming the bat of fur fibres by throwing the fur, in properly regulated quantities, against a section of the circumference of a perforated cone or other form, as the same is rotated, to present, in succession, every part of the circumference thereof to the current of impelled fur, and thereby obtain the required thickness of bat, when this is combined with the holding of the fibres on to the cone during the operation, by the pressure of the surrounding atmosphere, induced by exhausting the air from within the said perforated cone, or other form.

In the accompanying drawings (*a*) is a frame properly adapted to the operative parts of the machine, and (*b*) the lower feed apron, on which the stock is spread by the attendant in separate parcels, each sufficient for the formation of a hat, according to its intended weight. This
166 apron, or endless belt of cloth or other suitable material, passes around a roller (*c*) and a lip (*d*); the former at the back of the machine, with its bearings in sliding boxes governed by set screws (*ee*) for the purpose of tightening the apron; and the latter near to the rotating brush (*f*), and so formed as to present a slightly rounded edge for the apron to pass over where it presents the fur to the action of the brush. Instead of this slightly rounded edge, a small metallic roller may be substituted; but when this is done, the roller should be supported at different points between its end-journals, and this he effected by letting it run in a circular groove in the lip, as represented in section at figure 4, where (*g*) indicates this roller. The fur, as it is carried along towards the lip (*d*), is gradually compressed by the upper apron (b^1), which passes around a feed roller (c^1) and lip (d^1) in manner similar to the under feed apron. The roller (c^1) runs in a frame (*i*)—of which the lip (d^1) forms part—hung on journals that rest in standards (*j*), so that the lip (d^1) can be made to press on to the fur between it and the under lip (*d*,) and thus gripe the fibres and present them to the effective action of the brush (*f*). The under plane of the upper apron (b^1) is inclined to the upper plane of the lower one (*b*), the more effectually to present the fibres in the proper manner to the brush.

The roller (c^1) of the upper apron runs in sliding-boxes, governed by set screws (e^1 e^1), and is placed forward of the journals of the frame, so that the tension of the belt (i^2), which communicates motion from the lower roller (*c*) to the upper one (c^1) may press the upper lip (d^1), on the under lip (*d*); but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure, under similar circumstances.

The fibres, as they pass from the feed-aprons, are acted upon by a brush (*f*) that rotates with great velocity, and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed if desired. As the fibres are first presented, they are *are* brushed and properly laid, by the downward action of the brush, as indicated by the arrow, and
167 when liberated are carried down the curved surface (*l*) of a chamber or tunnel (*m*); and at the lower edge of this they meet a current of air—that enters a narrow aperture (*n*) near the bottom of the chamber, and extending the whole length of the brush—which being induced by the rotation of the brush and the partial vacuum in a perforated cone, prevents the fibres of fur from falling and resting on the bottom of the chamber, and carries them on to the perforated cone (*o*). This chamber extends over and under the brush and the forward part of the lips, and turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush. Its bottom rests on a set screw (*p*) to regulate the delivery-end of the chamber relatively to the cone. Its forward end, in addition to this, is provided with a hinged flap (*q*), regulated by a cam lever, as a means of regulating the delivery of the fibres. Its top (*r*) is gradually elevated and sides contracted, to make the delivery-aperture nearly of the form of the cone, but narrower and higher. And its upper part is provided with a hood (*s*), so curved as to correspond generally with the curve of the tip of the cone. This hood is hinged to the upper part of the delivery-aperture of the chamber, and is connected with an eccentric (*t*), by means of a cord (*u*), and bell-crank (u^1), that passes over a pully (r^{11},) so that each revolution of this eccentric carries the hood up and down to direct the discharge and distribute the fibres on to the cone—a greater thickness being desirable in the parts of the bat which form the brim than on the tip and crown; and when it is desired still further to diversify the distribution of the fibres, a cam can be substituted for the eccentric, and the connection between it and the hood is formed as represented in section at figure 5, where the cam (*t*) acts on a lever (t^1), connected with the hood (*s*) by the cord (*u*).

The cone (*o*) is made in the usual manner, but of thin sheet-metal, perforated, instead of wire-gauze. Its lower edge fits in a metallic ring (*w*), that runs in an appropriate collar in the upper part of a case (*x*), and its outer periphery is provided with cogs that mash into the cogs of a pinion (*y*)—concealed in the drawing by the pulley (d^2)—on a vertical shaft (*z*), by which a slow rotary motion is
168 given to the cone, as the fibres are thrown on to it, to distribute them equally all around the cone. The case (*x*) is sufficiently long to receive two rings (*w*), one on each side of the pinion (*y*), by which both are kept in motion, and it—the case—is made to swivel on a hollow collar (f^1), to which its bottom is fitted, so that when one cone is covered it may be turned aside by turning the case half a revolution, and another cone put on to the other ring, that another bat may be in the process of forming, whilst the one already formed may be prepared for the hardening process in the manner to be hereafter described.

The case (x) communicates through the hollow collar (f^1) with an exhausting fan-blower (g^1), which consists of a vertical arbor (h^1) with oblique vanes (i^1), so that when rotating with great velocity in the direction of the arrow the air is exhausted from the case (x) and the perforated cone (o). When one of the cones is removed from one of the rings (w) to be taken to the hardening apparatus, the aperture in the ring (w) must be closed up with a cap-plate (w^2) to prevent the access of air. Any other mode of exhausting the case and cone may be employed, but this is the most efficient which he (Wells) essayed.

The preparation of the formed bat for hardening is effected by covering it with pieces of felt or fulled cloth just taken from hot water, and this is done in the following manner, namely: The attendant takes from a kettle of hot water a piece of felt cloth rolled up on a roller and applies one end of it to the surface of the bat, and as the cone rotates the felt cloth winds from the roller onto the bat on the cone. Another piece of felt cloth is put on the top and then a strong perforated metallic cone (k^1)—see figure 6—is put over the whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them whilst it is immersed in hot water to harden. As the perforated cone (o) is better when made very thin, the pressure of the water when drawing it out of the kettle after the bat has been hardened tends to, and would collapse it, and therefore, to prevent this, another perforated metallic cone (l^1)—see figure 7—is put inside (before the whole is immersed in hot water,) to sustain the pressure in drawing the whole out of the hardening kettle. The relative situation of the three cones, the bat and the covering felt cloth, preparatory to the hardening process, is represented on an enlarged scale at figure 8, which is a vertical section through the whole. The inner sustaining cone may be dispensed with, if desired, by making the cone (o) of greater thickness and strength.

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All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying drawings, in which (m^1) is a main line shaft, overhead, driven by any first mover. From the wheel (n^1) on it a band (o^1) extends to a pulley (p^1) on the shaft of the brush, which should make about two thousand revolutions per minute, more or less. From another wheel (q^1), on this same shaft, a band (r^1) extends to a pulley (s^1), on the shaft of which there is a wheel (t^1) that drives the exhaust-fan (g^1) by the belt (u^{11}). And from a pulley (v^1), on the same line shaft, a belt extends to a wheel (w^1), on the shaft of which there is a pulley (x^1), from which extends another belt (y^1) to a wheel (z^1) on the shaft (a^2)—that carries the eccentric (t)—to give all the reduced motions required for the other parts of the machinery. From a wheel (b^2) on this shaft a belt (c^2) extends to a pulley (d^2) on the shaft (z) that rotates the cone (o). And another pulley (e^2) drives the wheel (f^2) of the feed-roller (c) by the belt (g^2); and on the other end of the axle of this feed-roller there is a pulley (h^2) which drives by a cross-belt (i^2) the upper feed-roller (c^1.) If desired, an alarm can be connected with the feed-roller of the lower apron to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arbor of the feed-roller (c) of the lower

feed-apron, by a belt, with a wheel (k^2) provided with a cam or pin to lift at every revolution the hammer (l^2) of a bell (m^2), the striking of which shall give requisite indication.

It will be obvious, from the foregoing, that the hood may be operated by hand instead of machinery, thus substituting the attention, skill, and cost of an operative for the positive regularity and cheapness of mechanical movements. It may be well to add, as a mere matter of precaution, that this invention is not limited to the making of hat-bodies, but to the making of bats on formers of any
170 other shape or configuration, the form of the delivery-aperture of the chamber and the hood, and the movements of the latter being properly adapted to the change of form of the perforated mold or former with the restrictions indicated.

Having thus described the mode of application of the said invention of the said Henry A. Wells, as the same was successfully reduced to practice by him, we do not wish to be understood as limiting the claim of invention to such mode of application, as other modes may be devised, operating on the same principle, or having the same mode of operation, and only differing therefrom in the substitution of equivalent means.

What is claimed herein as the invention of the said Henry A. Wells, deceased, is forming bats of fur fibres by throwing the fur, in properly regulated quanties, substantially as herein described, against a section of the circumference of a perforated cone or other form, as the same is rotated, to present in succession every part of the circumference thereof to the current of impelled fur to obtain the required thickness of bat, substantially as described, in combination with the method of holding the fibres on to the cone or other form during the operation, substantially as described, and for the purpose specified.

CHARLES ST. JOHN.
H. A. BURR.
A. H. WRIGHT.
JAMES M. RIMBLET.

Witnesses:
WM. H. BISHOP.
CHAS. A. WILSON.

171 Re-issue No. 400.

The United States of America to all to whom these letters patent shall come:

Whereas, Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, of New York, N. Y., assignees of Henry A. Wells, deceased, have alleged that said Wells did, in his lifetime, invent a new and useful improvement in manufacturing hat-bodies, (for which letters patent were issued to said Wells, dated 25th April, 1846, which letters having been surrendered by said assignees, the same have been canceled, and separate letters patent ordered to issue to them on an amended specification,) which said Wells stated had not been known or used before his application, he having made oath

that he was a citizen of the United States; that he did verily believe that he was the original and first inventor or discoverer of the said improvement; and that the same had not, to the best of his knowledge and belief, been previously known or used; said assignees having paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, their heirs, administrators, or assigns, for the term of fourteen years from the said twenty-fifth day of April, one thousand eight hundred and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said assignees, in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

172 Given under my hand at the city of Washington, this seventh day of October, in the year of our Lord one thousand eight hundred and fifty-six, and of the independence of the [L. S.] United States of America the eighty-first.

GEO. C. WHITING,
Acting Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

C. MASON,
Commissioner of Patents.

The Schedule referred to in these letters patent, and making part of the same.

To all whom it may concern:

Be it known, that Henry A. Wells, late of the city, county, and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in the process of and machinery for making hat-bodies of fur, for which said improvements letters patent of the United States were granted to the said Wells, bearing date the twenty-fifth day of April, 1846, of which the following is a full, clear, and exact description of the principle or character which distinguishes the said invention from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this description, in which figure 1 is a plan of the machine; figure 2, a longitudinal, vertical section; and figure 3, a longitudinal elevation. The other figures will be described in their appropriate places. The same letters indicate like parts in all the figures.

It has long been tried to make hat-bodies by throwing the fibres of fur, wool, etc., by a brush or picker cylinder on to a perforated cone, exhausted by a fan below, to carry and hold the fibres thereon by the currents of air that rush from all directions towards and through the

apertures of the cone, and thus form a bat of fibres ready for hardening and felting; but from various causes all these attempts
173 have failed. Hat-bodies are required to be made thick at and near the rim, and thin along the crown and tip, that the required strength may be given where it is required, without making the hat too heavy, and at too great a cost of material. This disposition of the fur can be obtained by the skill and judgment of the workman by the hand process, known under the name of "bowing," but cannot by the plan above referred to, for the reason that the fibres are only controlled by the currents induced through the apertures of the cone, or other form, by the exhaust, instead of being thrown and properly directed for distribution, on to the cone or other form. When the fibres are not properly thrown and directed, but are drawn to the surface by the action of the exhaust, the force thus induced gradually decreases as the apertures in the cone are closed up by the accumulation of the fur deposited on the outer surface thereof, and in consequence the impelling force, which carries the fibres, becomes insufficient to control the force of gravity which will then prevail and cause the fibres to accumulate to a greater thickness on the tip of the cone, where much less is required than below. And the said suggested plan cannot produce a practical result for the further reason that there is no mode described by which the bat of fur-fibres can be hardened while on the cone, that it may be removed from such cone preparatory to the after and well-known process of sizing or felting.

The invention of the said Henry A. Wells, by which the required practical result was obtained, consists in forming the bat of fur fibres, on a perforated cone or other form, in the manner substantially as above described, in combination with the hardening of such bat while on such cone or other form, to give it the required consistency to admit of taking it off in a suitable condition for sizing by the well-known process of felting.

In the accompanying drawings (*a*) is a frame properly adapted to the operative parts of the machine, and (*b*) the lower feed-apron, on which the stock is spread by the attendant in separate parcels, each sufficient for the formation of a hat, according to its intended weight.

This apron, or endless belt of cloth, or other suitable material,
174 passes around a roller (*c*) and a lip (*d*)—the former at the back of the machine, with its bearings in sliding-boxes governed by set screws (*ee*) for the purpose of tightening the apron, and the latter near to the rotating brush (*f*), and so formed as to present a slightly rounded edge for the apron to pass over where it presents the fur to the action of the brush. Instead of this slightly rounded edge a small metallic roller may be substituted, but when this is done the roller should be supported at different points between its end journals, and this he effected by letting it run in a circular groove in the lip, as represented in section at figure 4, where (*g*) indicates this roller. The fur, as it is carried along towards the lip (*d*), is gradually compressed by the upper apron (b^1), which passes around a feed-roller (c^1) and lip (d^1), in manner similar to the under feed-apron. The roller (c^1) runs in a frame (*i*)—of which the lip (d^1) forms part—hung on journals that rest in standards (*j*), so that the

that he was a citizen of the United States; that he did verily believe that he was the original and first inventor or discoverer of the said improvement; and that the same had not, to the best of his knowledge and belief, been previously known or used; said assignees having paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, their heirs, administrators, or assigns, for the term of fourteen years from the said twenty-fifth day of April, one thousand eight hundred and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said assignees, in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

172 Given under my hand at the city of Washington, this seventh day of October, in the year of our Lord one thousand eight hundred and fifty-six, and of the independence of the [L. S.] United States of America the eighty-first.

GEO. C. WHITING,
Acting Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

C. MASON,
Commissioner of Patents.

The Schedule referred to in these letters patent, and making part of the same.

To all whom it may concern:

Be it known, that Henry A. Wells, late of the city, county, and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in the process of and machinery for making hat-bodies of fur, for which said improvements letters patent of the United States were granted to the said Wells, bearing date the twenty-fifth day of April, 1846, of which the following is a full, clear, and exact description of the principle or character which distinguishes the said invention from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this description, in which figure 1 is a plan of the machine; figure 2, a longitudinal, vertical section; and figure 3, a longitudinal elevation. The other figures will be described in their appropriate places. The same letters indicate like parts in all the figures.

It has long been tried to make hat-bodies by throwing the fibres of fur, wool, etc., by a brush or picker cylinder on to a perforated cone, exhausted by a fan below, to carry and hold the fibres thereon by the currents of air that rush from all directions towards and through the

apertures of the cone, and thus form a bat of fibres ready for hardening and felting; but from various causes all these attempts
173 have failed. Hat-bodies are required to be made thick at and near the rim, and thin along the crown and tip, that the required strength may be given where it is required, without making the hat too heavy, and at too great a cost of material. This disposition of the fur can be obtained by the skill and judgment of the workman by the hand process, known under the name of "bowing," but cannot by the plan above referred to, for the reason that the fibres are only controlled by the currents induced through the apertures of the cone, or other form, by the exhaust, instead of being thrown and properly directed for distribution, on to the cone or other form. When the fibres are not properly thrown and directed, but are drawn to the surface by the action of the exhaust, the force thus induced gradually decreases as the apertures in the cone are closed up by the accumulation of the fur deposited on the outer surface thereof, and in consequence the impelling force, which carries the fibres, becomes insufficient to control the force of gravity which will then prevail and cause the fibres to accumulate to a greater thickness on the tip of the cone, where much less is required than below. And the said suggested plan cannot produce a practical result for the further reason that there is no mode described by which the bat of fur-fibres can be hardened while on the cone, that it may be removed from such cone preparatory to the after and well-known process of sizing or felting.

The invention of the said Henry A. Wells, by which the required practical result was obtained, consists in forming the bat of fur fibres, on a perforated cone or other form, in the manner substantially as above described, in combination with the hardening of such bat while on such cone or other form, to give it the required consistency to admit of taking it off in a suitable condition for sizing by the well-known process of felting.

In the accompanying drawings (*a*) is a frame properly adapted to the operative parts of the machine, and (*b*) the lower feed-apron, on which the stock is spread by the attendant in separate parcels, each sufficient for the formation of a hat, according to its intended weight.

This apron, or endless belt of cloth, or other suitable material,
174 passes around a roller (*c*) and a lip (*d*)—the former at the back of the machine, with its bearings in sliding-boxes governed by set screws (*ee*) for the purpose of tightening the apron, and the latter near to the rotating brush (*f*), and so formed as to present a slightly rounded edge for the apron to pass over where it presents the fur to the action of the brush. Instead of this slightly rounded edge a small metallic roller may be substituted, but when this is done the roller should be supported at different points between its end journals, and this he effected by letting it run in a circular groove in the lip, as represented in section at figure 4, where (*g*) indicates this roller. The fur, as it is carried along towards the lip (*d*), is gradually compressed by the upper apron (b^1), which passes around a feed-roller (c^1) and lip (d^1), in manner similar to the under feed-apron. The roller (c^1) runs in a frame (*i*)—of which the lip (d^1) forms part—hung on journals that rest in standards (*j*), so that the

lip (d^1) can be made to press on to the fur between it and the under lip (d), and thus gripe the fibres and present them to the effective action of the brush (f). The under plain of the upper apron (b^1) is inclined to the upper plane of the lower one (b), the more effectually to present the fibres in the proper manner to the brush.

The roller (c^1) of the upper apron runs in sliding-boxes, governed by set screws (e^1e^1), and is placed forward of the journals of the frame, so that the tension of the belt (i_2), which communicates motion from the lower roller (c) to the upper one (c^1), may press the upper lip (d^1) on the under lip (d); but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure under similar circumstances.

The fibres, as they pass from the feed-apron, are acted upon by a brush (f) that rotates with great velocity, and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed if desired. As the fibres are first presented, they are brushed and properly laid by the downward action of the brush, as indicated by the arrow, and when liberated are carried down the curved surface (l) of a chamber or tunnel (m); and at the lower edge of this they meet a current of air —that enters a narrow aperture (n) near the bottom of the chamber, and extending the whole length of the brush— which, being induced by the rotation of the brush and the partial vacuum in a perforated cone, prevents the fibres of fur from falling and resting on the bottom of the chamber, and carries them on to the perforated cone (o). This chamber extends over and under the brush and the forward part of the lips, and turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush. Its bottom rests on a set screw (p) to regulate the delivery-end of the chamber relatively to the cone. Its forward end, in addition to this, is provided with a hinged flap (q), regulated by a cam lever, as a means of regulating the delivery of the fibres. Its top (r) is gradually elevated, and sides contracted, to made the delivery-aperture nearly of the form of the cone, but narrower and higher. And its upper part is provided with a hood (s), so curved as to correspond generally with the curve of the tip of the cone. This hood is hinged to the upper part of the delivery-aperture of the chamber, and is connected with an eccentric (t) by means of a cord (u) and bell-crank (u^1) that passes over a pulley (r^{11}), so that each revolution of this eccentric carries the hood up and down to direct the discharge and distribute the fibres on to the cone—a greater thickness being desirable in the parts of the bat which form the brim than on the tip and crown; and when it is desired still further to diversify the distribution of the fibres, a cam can be substituted for the eccentric, and the connection between it and the hood is formed as represented in section at figure 5, where the cam (t) acts on a lever (t^1) connected with the hood (s) by the cord (u).

The cone (o) is made in the usual manner, but of thin sheet-metal, perforated, instead of wire-gauze. Its lower edge fits in a metallic ring (w) that runs in an appropriate collar in the upper part of a case (x,) and its outer periphery is provided with cogs that mash into the

cogs of a pinion (y)—concealed in the drawing by the pulley (d^2)—on a vertical shaft (z,) by which a slow rotary motion is given to the cone, as the fibres are thrown on to it, to distribute them equally all around the cone. The case (x) is sufficiently long to receive
176 two rings (w,) one on each side of the pinion (y,) by which both are kept in motion, and it (the case) is made to swivel on a hollow collar (f^1,) to which its bottom is fitted, so that when one cone is covered it may be turned aside by turning the case half a revolution, and another cone put on to the other ring, that another bat be in the process of forming, whilst the one already formed may be prepared for the hardening process in the manner to be hereafter described.

The case (x) communicates through the hollow collar (f^1) with an exhausting fan-blower (g^1,) which consists of a verticle arbor (h^1) with oblique vanes (i^1,) so that when rotating with great velocity in the direction of the arrow, the air is exhausted from the case (x) and the perforated cone (o.) When one of the cones is removed from one of the rings (w,) to be taken to the hardening apparatus, the aperture in the ring (w) must be closed up with a cap-plate (w^2) to prevent the access of air. Any other mode of exhausting the case and cone may be employed, but this is the most efficient which he (Wells) essayed.

The preparation of the formed bat for hardening is effected by covering it with pieces of felt or fulled cloth, just taken from hot water, and this is done in the following manner, viz: The attendant takes from a kettle of hot water a piece of felt cloth, rolled upon a roller, and applies one end of it to the surface of the bat, and as the cone rotates, the felt cloth winds from the roller on to the bat on the cone. Another piece of felt cloth is put on the top, and then a strong, perforated metallic cone (k^1)—see figure 6—is put over the whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them while it is immersed in hot water to harden. As the perforated cone (o) is better when made very thin, the pressure of the water when drawing it out of the kettle, after the bat has been hardened, tends to, and would collapse it, and therefore to prevent this, another perforated metallic cone (l^1)—see figure 7—is put inside, (before the whole is immersed in hot water,) to sustain the pressure in drawing the whole out of the hardening-kettle. The relative situation of the three cones, the bat and the covering felt cloth, preparatory to the hardening process, is represented on an enlarged
177 scale at figure 8, which is a vertical section through the whole. The inner sustaining cone may be dispensed with, if desired, by making the cone (o) of greater thickness and strength.

All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying drawings, in which (m^1) is a main line shaft overhead, driven by any first mover. From a wheel (n^1) on it, a band (o^1) extends to a pulley (p^1) on the shaft of the brush, which should make about two thousand revolutions per minute, more or less. From another wheel (q^1,) on this same shaft, a band (r^1) extends to a pulley (s^1,) on the shaft of which there is a wheel (l^{11}) that drives the exhaust-fan (g^1) by the belt (u^{11}.) And from a pulley (v^1) on the same line shaft, a belt ex-

tends to a wheel (w^1,) on the shaft of which there is a pulley (x^1,) from which extends another belt (y^1) to a wheel (z^1) on the shaft (a^2) that carries the eccentric (t,) to give all the reduced motions required for the other parts of the machinery. From a wheel (b^2) on this shaft, a belt (c^2) extends to a pulley (a^2,) on the shaft (z) that rotates the cone (o.) And another pulley (e^2) drives the wheel (f^2) of the feed-roller (c) by the belt (g^2;) and on the other end of the axle of this feed-roller there is a pulley (h^2) which drives, by a cross-belt (i^2,) the upper feed-roller (c^1.) If desired an alarm can be connected with the feed-roller of the lower apron to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arbor of the feed-roller (c) of the lower feed-apron, by a belt, with a wheel (k^2) provided with a cam or pin, to lift at every revolution the hammer (l^2) of a bell (m^2,) the striking of which shall give requisite indication.

It will be obvious from the foregoing, that the hood may be operated by hand instead of machinery, thus substituting the attention, skill and cost of an operative for the positive regularity and cheapness of mechanical movements. It may be well to add, as a mere matter of precaution, that this invention is not limited to the making of hat-bodies, but to the making of bats on formers of any other shape or configuration, the form of the delivery aperture of the chamber and the hood, and the movements of the latter, being properly
178 adapted to the change of form of the perforated mould or former, with the restrictions indicated.

Having thus described the mode of application of the said invention of the said Henry A. Wells, as the same was successfully reduced to practice by him, we do not wish to be understood as limiting the claim of invention to such mode of application, as other modes may be devised, operating on the same principle, or having the same mode of operation, and only differing therefrom in the substitution of equivalent means.

What we claim as the invention of the said Henry A. Wells, deceased, in the process of making fur hat-bodies, is the forming of the bat of fur fibres on a perforated cone, or other form, in manner substantially as described, in combination with the hardening of such bat, while on such cone or other form, to give it the required consistency to admit of taking it off in a suitable condition for sizing by the well-known process of felting, substantially as described.

CHARLES ST. JOHN.
H. A. BURR.
A. H. WRIGHT.
JAMES M. RIBLET.

Witnesses: WM. H. BISHOP,
ALEX. PORTER BROWNE.

179 *The United States Patent Office to all persons to whom these presents small come, greeting:*

This is to certify that the annexed is a true copy from the records of this office of letters patent issued to Alva B. Taylor, March 18th, 1856.

In testimony whereof, I, Joseph Holt, commissioner of patents, have caused the seal of the Patent Office to be hereunto affixed, [L. S.] this twentieth day of September, in the year of our Lord one thousand eight hundred and fifty-eight, and of the independence of the United States the eighty-third.

J. HOLT.

Reissue, No. 14,476.

The United States of America to all to whom these letters patent shall come:

Whereas, Alva B. Taylor, of Newark, New Jersey, has alleged that he has invented a new and useful improvement in machinery for making hat-bodies, which he states has not been known or used before his application; has made oath that he is a citizen of the United States, that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Alva B. Taylor, his heirs, administrators, or assigns, for the term of fourteen years, from the eighteenth day of March, one thousand eight hun-
180 dred and fifty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Taylor in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

[L. S.] Given under my hand, at the city of Washington, this eighteenth day of March, in the year of our Lord one thousand eight hundred and fifty-six, and of the independence of the United States of America the eightieth.

ROBERT McCLELLAND,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

C. MASON,
Commissioner of Patents.

The schedule referred to in these letters patent, and making part of the same.

To all whom it may concern:

Be it known that I, Alva B. Taylor, of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful improvements in the machinery and process of manufacturing hat-bodies, and I do hereby declare that the following is a full, clear, and

exact description of the same, reference being had to the drawings which are hereto annexed, and in which figure 1 represents a side elevation of my improved hat-body machinery; figure 2 is an end elevation of the same; figure 3 is a vertical section thereof; figure 4 is a plan of the fan-case and draught-box, certain portions being removed to show the interior arrangement of the parts; and figure 5 is a plan of the scolloped-edged wheel and reciprocating-bar.

Various machines have been constructed for manufacturing
181 hat-bodies, which operate upon the general plan of first disseminating the fur or other stock in a flocculent state in the air, and afterwards collecting it upon the surface of a perforated conical former by means of the currents of air induced by exhausting the air from within the cone.

When flocculent fur has been collected upon a perforated cone in the form of a bat, it is necessary to harden it, in order to permit it to be handled and fit it for the subsequent processes. In manufacturing hat bodies by hand the hardening of the bat is effected by wrapping it in a moist linen cloth and working it by hand. In the manufacture by machinery it is expedient to harden the bat before it is removed from the perforated cone, so that it may be handled without danger of injury. This hardening has been effected by means of water, applied either in the form of a shower or jets, or in that of a bath, into which the cones with that of the bats upon them are dipped.

Although this method of hardening is effected with much less labor than the hand process, it is attended with the defect that the bats are soaked with water; and although the water is removed to a considerable extent by squeezing the bats, enough nevertheless remains to cause the souring and injury of the bats.

The process of hardening by means of water also injures the color of the finer qualities of fur; moreover, hat-bodies hardened by the wet process are not as well fitted for the subsequent operations required to convert them into hats.

The object of my improvements is, to harden the bat sufficiently to permit it to be removed from the perforated cone without the application of water, and to facilitate the removal of the bat from the cone without requiring the latter to be taken from its position in the machine. These improvements consist in a mechanical process of hardening the bat before it is removed from the cone, and in facilitating the removal of the bat from the cone by means of a blast of air forced through the cone. There are also various improvements in the arrangement and construction of the machinery devised by me will hereinafter more fully appear.

In the accompanying drawings, A is the frame of the picker,
182 upon which the picking-cylinder and feed motion are mounted, and to which the shafts are secured, by means of which motion is imparted to various parts of the machine. The upper portion, *a*, of this picker-frame is made separate from the lower, and is attached to the latter by hinges or pivots, so that the end of the upper portion of the frame, at which the picking-cylinder, B, is situated, can be raised or depressed to adjust the position of the picking-cylinder to perforated cones of different dimensions. This adjustment of the upper portion of the picker-frame is effected by turning a screw, *b*,

which passes through a nut which is made fast to a cross-bar, *c*, of the lower portion of the picker-frame, and bears against a cross bar, c^1, that connects together the sides of the upper portion of the picker-frame. The upper portion of the picker-frame is steadied and guided, as it is raised or depressed, by guide pins, which project downwards from the upper cross-bar, c^1, through corresponding holes in the lower cross-bar *c* The feed-motion consists of an endless band or apron, c, which runs upon two rollers, *d* d^1, situated near the opposite extremities of the upper portion, *a*, of the picker-frame. One of these rollers, *d*, has a pulley-wheel, D, secured to its axle, to receive a belt by which a rotary motion is imparted to the roller from the main shaft, E, at the lower part of the frame. The feed-apron conveys the stock to a pair of feed-rollers, *e e*, which are situated immediately in front of the picking-cylinder, B. Motion is imparted to the lower of these feed-rollers from the shaft of the feed-apron roller, *d*, by means of a belt which encircles a belt-pulley secured to the shaft, and a corresponding one upon the axle of the feed-roller. The upper roller is driven from the lower by means of a pair of pinions whose teeth engage, and which are secured to the axles of the respective feed-rollers. In order that the feed-rollers may gripe the fur more securely, the upper one should be pressed toward the lower by springs or weights, and the barrels of the two rollers should be slightly fluted.

The picking-cylinder, B, which revolves in close proximity with the feed-rollers, has its barrel studded with teeth, which act upon the fur presented to them by the rollers. It should be driven at a high speed; and in the machine represented in the accompanying
183 drawings motion is imparted to it from the counter-shaft, E^1, by means of a belt which encircles a suitable belt-pulley secured to the shaft, and a corresponding belt-pulley from the shaft of the picking-cylinder. The counter-shaft, E^1, is driven from the main shaft, by means of cog-wheels secured to the respective shafts. The picking-cylinder revolves in the direction indicated byhe arrow placed beneath it, in figure 3, and it is covered with a cap or case, F, which extends its whole length, and acts as a deflecting plate, to cause the fur, which naturally tends to adhere to the picking-cylinder, to pass off from the latter in the direction indicated by the red arrows in figure 1. It also prevents the stock upon the feed-apron from passing accidentally over the upper feed-roller.

The perforated cone, G, which receives the fur from the picking-cylinder, forms one of a series of three, G, G^1, G^2, which project radially from a pyramidal draught-box, H The draught-box is supported by a fan-case, I, which is sufficiently large to form a firm base for the draught-box, as well as to contain the fan by which the draught is maintained through the perforations of the cones. The draught-box has a collar-plate, *i*, at its bottom, which fits loosely upon a corresponding collar on the top of the fan-case, I, beneath the draught-box, in such manner that the draught-box, with the cones upon it, can be turned upon its axis, to bring each cone in turn in the proper position to receive the flocculent fur from the picking-cylinder. In order to hold the draught-box with the cones upon it stationary until the proper quantity of fur is collected upon the cone opposite

the picker, one of its corners is engaged with a spring-catch, g, which is secured to the top of the fan-case. The circular space within the collar-plates is open, so as to permit a free draught from the interior of the draught-box to the fan-case beneath; a circular opening is also made in each face of the draught-box, behind the base of each perforated cone, so as to permit the draught to be drawn through the cone into the draught-box.

Each perforated cone is made fast by a rim at its base to a ring-plate, *f*, whose face is sufficiently broad to receive perforated cones of the various sizes used in the manufacture of hat-bodies; and the
184 ring-plate is secured to a short shaft, *j*, that projects radially outwards from the axis of the draught-box. The inner journal of each of these radiating shafts is supported in a hub, K, at the centre of the draught-box, and the outer journal of each shaft is supported by a bridge-tree, *m*, which crosses the opening in the face of the draught-box. The radiating shafts are fitted with radiating wheels, J, whose teeth engage with a corresponding beveled wheel, J^1, that is secured to an upright shaft, K, passing through the hub of the draught-box. This upright shaft extends upwards sufficiently to pass through and project a short distance beyond the top of the draught-box; it also extends downwards into the fan-case beneath, where it is fitted with a worm-wheel, *l*, to which motion is imparted by a worm, l^1, upon a horizontal shaft, E^2. The fan, M, by which the draught is maintained, is of the screw variety. It is situated at the mouth of a circular opening in a partition, L, which crosses the fan-case and divides it into two parts, the larger of which communicates by the opening in the collar-plates with the draught-box above, while the smaller communicates with an air-trunk situated beneath the floor of the factory, so that the air drawn from the perforated cones, through the draught-box and larger compartment of the fan-case, is discharged into the smaller compartment, from which it escapes through the air-trunk. The fan-shaft, E^3, is fitted with a belt-pulley, and is driven from the counter shaft, E, of the picker frame, by means of a belt which also passes over a pulley upon the worm-shaft, E^2, and drives the latter.

The axis of the draught-box is inclined, in order that when the draught-box is turned upon the collar-plates the perforated cones may readily pass beneath the picking-cylinder. The draught-box is also set close to the picker-frame, so that the perforated cone, upon which the fur from the picker is received, is separated by no greater space from the latter than is necessary to permit the perforated cones to pass the picker-frame when the draught-box is turned. The inclination of the axis of the draught-box requires a corresponding inclination in the upright shaft, K, which is sufficient to permit the teeth of the worm-wheel to work freely in the worm, without requiring them to be skewed.

As has been stated, there are three perforated cones, G, G^1,
185 G^2, upon the draught-box; one of these, G, figures 1 and 2, is in the proper position to receive the fur delivered by the picking-cylinder, being opposite thereto and extending lengthwise therewith. That portion of the conical surface which is nearest to the picking-cylinder being slightly oblique thereto, as shown in the

accompanying drawings. This position of the cone, with reference to the picker, is attained by setting the radiating shaft *j* at a suitable inclination to the upright shaft K, and the draught-box is made of pyramidal form, in order to accommodate its sides to the position of the base of the cone. Of the other two cones, one, G^1, is in a proper position for the hardening of the coating of fur or bat, which has collected upon it. This hardening is effected by the combined action of pressure and motion. The pressure is imparted by means of a conical cover, G^3, which lies loosely upon the bat, upon which cover a series of weighted rollers, N, rests. A rapid reciprocating movement is imparted to the cover by means of a bar, O, which slides radially to and fro across the top of the draught-box. The outer extremity of this reciprocating bar is fitted with an arm, *n*, that projects downwards, and is received in a ring groove, which is formed in a boss, *o*, secured to the head of the cover. The inner half of the reciprocating bar has two pins, *r*, r^1, protruding from its upper face, which are acted upon alternately by the scalloped rim of a wheel, P, that is secured to the upper end of the upright shaft K. The reciprocating bar is prevented from turning with the scalloped wheel, P, by a guide standard, *q*, in which the outer end of the reciprocating bar slides, while its inner extremity is maintained in its proper position by the upright shaft K, which passes through a slot in the bar; hence, as the upright shaft and the scalloped wheel upon it revolve, a short and rapid or tremulous reciprocating movement is imparted to the reciprocating bar O, and from it by means of the arm *n*, at its outer end, to the cover G^3, that is born upon the bat by the weight of the rollers N.

In order that the hardened bat may be readily removed from the perforated cone, a blast of air is forced through the cone into the interior of the bat. This blast of air is obtained from the fan in
186 the fan-case beneath in the following manner: The interior of the draught-box is divided by three radial partitions, *S*, *S*, *S*, which extend inwards to the central hub *k*, into three divisions, one of which corresponds with each perforated cone. That portion of each radial partition which is above the circular opening in the collar-plates *i*, and below the central hub *k*, is cut away, so as to leave the cylindrical space above the circular opening in the collar-plates unobstructed. A curved partition, *t*, projects upwards into this cylindrical space from the fan-case beneath. This curved partition is so secured by its lower edge to the collar-plate upon the fan-case, and it is of such height and breadth that it closes the space between two of the radial partitions *S*, *S*, and shuts off one division of the draught-box and the perforated cone communicating therewith from the remaining two, so that the draught passing to the fan-case cannot be drawn through the perforated cone, whose base is adjacent to the curved partition. That portion of the top of the fan-case which is immediately beneath the division of the draught-box from which the draught is shut off is cut away, so as to form a communication between the division of the draught-box and the smaller compartment of the fan-case into which the fan discharges air; hence a portion of the air forced by the fan into the smaller compartment of the fan-case,

and intending to escape therefrom, finds its way upwards into the cone, and passing through the perforations thereof, presses upon the interior of the hat-body and assists its disengagement from the cone.

The various parts of the machinery thus described are caused to move by imparting a rotary motion to the main shaft E, from the prime mover of the manufactory. When the machine is in operation, the feed-apron, feed-rolls, picking-cylinder and perforated cones move in the directions respectively indicated by the arrows in the drawings. A weighed quantity of fur, or other suitable stock, sufficient to form one hat-body, is laid by the attendant upons the feed-apron, and is conveyed by it to the feed-rollers, which present it to the picking-cylinder. The latter, in its rapid revolution, picks the fur and carries it round with it until it is deflected by the casing of the picking-cylinder.

When the fur leaves the cylinder it is drawn towards the per-
187 forated cone immediately opposite; as this cone slowly revolves, the flocculent fur collects upon it until the charge upon the feed-apron is exhausted; at this point of the operation the attendant stops the feed-apron, upon which he has meanwhile been distributing a second charge, which is separated by a short vacant space from the first one. As soon as the whole of the fur is collected upon the perforated cone, an attendant applies a cover to the bat, and then turns the draught-box one third round; this movement brings a second cone in the proper position to receive fur from the picker, while the first one, with the bat and cover upon it, is brought to the hardening apparatus, where the pressure applied by the cover, combined with the tremulous movement imparted to it, induces a rapid felling of the fibres of fur and the consequent hardening of the bat. This operation proceeds so quickly, that by the time the second cone has received a charge of fur upon it from the picking-cylinder, the bat upon the first one is sufficiently hardened to bear handling without injury. The draught box is now turned a second third of a revolution, by which movement the third cone is presented to the picking-cylinder, the second one passes to the hardening apparatus, and the first, with its hardened bat, is freed from the hardening apparatus, and is in the proper position for the removal of the bat.

This operation is effected by shaking the cover by hand, when the pressure of the air within the cone detaches the hardened bat so that it may be readily withdrawn with the cover, leaving the perforated cone free and ready to be again presented to the picking-cylinder. After the hardened bat or hat-body is removed from the machine, the hardening process may he carried to a greater extent by wrapping the bat in a damp linen cloth and working it by hand in the same manner that bats are worked in the manufacture of hat-bodies by hand. The dimensions of the cover, G^3, witn respect to the bat, are not important, provided that it may be large enough to pass easily over it; as the object of the cover is not to confine the fur, but to impart pressure and moisture to it. If the cover be of nearly the same size as the bat, it should be perforated to permit the air to press upon the

bat, but if the cover be five or six inches larger in diameter
188 than the bat, it is not necessary that it should be perforated,

as there will then be sufficient space for air to pass inside of the cover.

In the manufacture of hats it is customary to form the top of the cone of felt, or hat-body, thinner than the rest, while those parts of the hat-body which are to form the brim of the hat and to receive the hat-band should be thicker than the rest. In order to accomplish this result the fur must be unequally distributed over the perforated cone, a larger quantity being delivered to those parts where the hat-body is to be the thickest. I effect the requisite distri ution of the fur for this purpose by varying the feed to the different portions of the picking-cylinder.

From the foregoing description it will be perceived that the perforated cone is directly opposite the picking-cylinder, and is retained in its position while the fur is collecting; hence, the fur which proceeds from any one portion of the picking-cylinder lodges upon a corresponding portion of a perforated cone; and if it be necessary to increase the thickness of the bat at any particular part of the perforated cone, the operation is effected by distributing the charge of fur upon the feed-apron in such manner that there shall be more fur delivered to that part of the picking-cylinder which delivers fur to the part of the perforated cone where the bat is to be made the thickest; and, on the other hand, less fur is fed to that part of the picking-cylinder which delivers fur to the part of the perforated cone where the bat is to be made thin, and which is usually the head or tip.

As the fur delivered by any part of the picking-cylinder is always delivered to the same corresponding part of the perforated cone opposite the cylinder, it is easy in my machine to form different parts of the hat-body of different qualities. Thus, for example, an excellent and cheap hat-body can be formed partly of fur and partly of wool, In such a body those surfaces which appear to the eye, viz., the whole exterior, and the interior of the brim, should be formed wholly of fur, while the interior surface of the crown and the mass of the hat-body may be made of wool; such a hat-body is readily formed by my machinery, by feeding fur to that portion of the picking-
189 cylinder whence it is delivered to the part of the perforated cone that corresponds with the brim of the hat, while at the same time wool is fed to the other parts of the picking-cylinder. As soon as enough fur has been fed to form the surface of the interior of the brim, wool alone is fed to the picking-cylinder, and this is followed by a feed of fur alone, which being collected upon the perforated cone after the wool, coats it over and forms a fur surface to the whole exterior of the hat.

It will be evident to the skilful mechanic that various changes may be made in the machinery described by me, without materially effecting the principle of my invention, and I reserve to myself the right to make such changes as circumstances may require.

What I claim as my invention and desire to secure by letters patent is, the arrangement for hardening the hat-body in a dry state, by machinery operating substantially as herein set forth. I also claim

the method of facilitating the removal of the bat from the perforated cone by means of a blast of air forced through the cone.

In testimony whereof I have hereunto subscribed my name.

ALVA B. TAYLOR.

Witnesses:
E. CHAPIN.
E. S. RENWICK.

190

191 *Copy caveat of William Fosket, filed in the patent office, Nov.* 8, 1842.

Description of said Fosket's invention, so far as the same is completed, to be taken with the drawing, as a description thereof.

The improvements made by said Fosket, in the mode of constructing fur or wool hat-bodies, consist in an application of machinery for this purpose, and in some particulars in an application of machinery, of which the said Fosket claims to be the inventor.

Heretofore fur hat-bodies have, it is believed, been made by hand, and it has required an expert workman to make, in one day, four hat-bodies of fur, into the hay-cock or conical form, which is the first form required by hatters.

The said Fosket has invented a machine which entirely dispenses with hand labor for this purpose, which will enable one man to turn off at least thirty hat-bodies per hour, and which will make a much more even and better article than is now made by hand.

Said Fosket's invention, in the first place, separates the fibres of the fur or wool one from another, and scatters them in the air of the room. While thus suspended said fibres are drawn into a current of air, which, by the operation of machinery, is made to circulate through a conical screen of fine wire gauze, and are deposited by this current of air on said screen until the requisite thickness is obtained, when the hat-body is taken off, and is ready for hardening.

By reference to the drawing of the machine and its parts, herewith submitted, the operation of the machine and its various parts in producing the result will be readily perceived, and said drawing, with the foregoing remarks, are submitted, as sufficiently descriptive, without a more minute verbal description.

Said Fosket is aware that wool hat-bodies are now prepared by machinery, in the requisite form; but he believes that machinery has never before been invented for thus preparing fur hat-bodies.

192 He also believes that his invention, in its application to the making of wool hat-bodies, will prove a great improvement over the method now in use, by performing the work better and more expeditiously.

All of which is respectfully submitted.

WILLIAM FOSKET.

Attest:
A. PHELPS, Jr.,

193 *Copy specification of William Fosket's patent.*

Dated January 23, 1846.—No. 4363.

The United States of America to all to whom these letters shall come:

Whereas William Fosket, of Ware, Massachusetts, has alleged that he has invented a new and useful improvement in machinery for making hat-bodies, which he states has not been known or used before his application, has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose:

These are therefore to grant, according to law, to the said William Fosket, his heirs, administrators, or assigns, for the term of fourteen years, from the 23d day of January, one thousand eight hundred and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said William Fosket in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

[L. S.] Given under my hand, at the city of Washington, this twenty-third day of January, in the year of our Lord one thousand eight hundred and forty-six, and of the independence of the United States of America the seventieth.

JAMES BUCHANAN,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.

EDMUND BURKE,
Commissioner of Patents.

194 *The schedule referred to in these letters patent, and making part of the same.*

To all persons to whom these presents shall come:

Be it known that I, William Fosket, of Ware, in the county of Hampshire and State of Massachusetts, have invented certain new and useful machinery for manufacturing hat-bodies, and that the following specification of the same, taken in connection with the accompanying drawings, fully sets forth the nature and principles thereof, by which it may be distinguished from other inventions of like character.

Figure 1 of the drawings above mentioned represents a top view of my machine, in which the cover of the wired case is supposed to be removed in order to exhibit the position of the conical apparatus upon

which the hat-body is formed. Figure 2 is a vertical, central, and longitudinal section of the mechanism.

The fibrous material or wool, of which the felt is to be fabricated, is placed in sufficient quantities, as the same may be required, upon an endless feeding cloth, or apron, A, Figs. 1, 2, which rest and move upon or over the upper surface of a suitable table, B, and is revolved by passing around a roller, C, which is arranged in front of the table and operated by any proper means.

Just above that portion of the feeding cloth which rests upon the upper surface of the roller, C, a spring guide plate, D, is arranged so as to rest in contact, or nearly so, with the feeding cloth, the said guide plate being supported in position by suitable springs, E, E, or other contrivances of like nature, which permit it to rise above the cloth to the degree required to permit the passage of the wool into the machine, and at the same time to hold it, to allow the proper action of a bowstring, F, stretched in front of the guide plate and upon the tops of spring posts G, G.

A suitable passage, or tube, H, leads from the vicinity of the bowstring to what may be termed as the forming, or wind chamber, I, this latter being a square or circular box of convenient dimensions, around through the lower part of each of the sides of which various elongated orifices, K, are cut to permit the external atmosphere to have access to the interior of the chamber. Upon the central part of the bottom of the chamber a conical frame, L, of wire is raised, the same being of the size necessary for the formation of the hat-body.

195

This frame is covered on the outside with muslin, or fine wire gauze, or other suitable material of similar character, and while in operation it should have a continued slow rotary movement in a horizontal direction imparted to it by a band, R, operating around a pulley, S, applied to the said frame, as seen in figure 2.

By giving the conical gauze frame a rotary motion, the planking operation will be more evenly performed upon it than it would if it were stationary.

That part of the bottom of the wind chamber situated within the gauze frame opens by one or more suitable passages, M, figure 2, into a box, or pipe, or chamber, N, which leads to a fan-blower, or wind-wheel, O, placed in any convenient position, and revolved by any proper mechanism applied to it. The bowstring is operated by means of a wheel, P, arranged under the same, and having a series of teeth, R, R, extending from its circumference, and which come in contact with the string as the wheel is revolved, and produces the whipping or bowstring operation upon the wool, similar to that usually effected by hand process in felting.

The machinery being put in motion, the fan-blower or wheel draws a powerful current of air through the orifice K, and tube H, and into the wind chamber, from whence it rushes through the meshes of the conical guide frame, and is received into the case R, surrounding the fan-wheel O, and finally discharged therefrom by the action of the said fan-wheel.

The filaments of wool, separated from each other by the bowstring,

are drawn by the current of air, which enters through the tube H into the wind chamber, and toward the gauze frame, upon which they pile or overlay each other, and upon which they are to be pressed and upon each other, by revolving conical rollers, or other proper contrivances. The process is thus carried on until a sufficient quantity of the fibrous material to form the hat-body is deposited upon the conical gauze frame, which is afterwards to be removed therefrom and felted and treated in the usual manner.

196 Having thus explained my invention, I claim the combination with the wind chamber surrounding the conical frame, of gauze, of the apparatus which feeds the fibrous material into the chamber and whips or prepares it previous to its reception therein, the said apparatus consisting of the feeding apron, with its spring plate and bowstring; the whole being arranged and operating substantially in the manner as above specified and described.

In testimony that the above is a correct specification of my invention, I have hereto set my signature this 25th day of April, A. D. 1843.

WM. FOSKET.

Witnesses:
NORMAN NORTON.
MATHER V. KELLOGG.

197 *Copy patent and specification of Thomas Blanchard.*

No. 230.

The United States of America to all to whom these letters patent shall come:

Whereas Thomas Blanchard, of the city and State of New York, has alleged that he has invented a new and useful improvement in making a batting or web for hat-bodies, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the Treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose:

These are therefore to grant, according to law, to the said Thomas Blanchard, his heirs, administrators, or assigns, for the term of fourteen years from the fourteenth day of June, one thousand eight hundred and thirty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Thomas Blanchard in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

[L. S.] Given under my hand, at the city of Washington, this fourteenth day of June, in the year of our Lord one thousand eight hundred and thirty-seven, and of the independence of the United States of America the sixty-first.

JOHN FORSYTH,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.

HENRY L. ELLSWORTH,
Commissioner of Patents.

198 *The schedule referred to in these letters patent, and making part of the same.*

To all persons to whom these presents shall come:

Be it known that I, Thomas Blanchard, of the city, county, and State of New York, have invented a new and useful improvement in machinery for making a batting of web of fur, and that the following is a full and exact description of the construction and manner of operating said machine, as invented by me; that is to say: whereas certain machines called carding-machines are well known and in use by the manufacturers of cotton and wool, and other fibrous substances, and also certain machines are known and used by hatters, in conjunction with the carding-machine, for making hat-bodies of wool, but these machines, or any combination of them, have not heretofore been known or used for making a continued batting or web of fur; now my machine consists of the application of certain parts of such known machines in combination with other parts which have not heretofore been known or used in said machines, the old and new parts being so arranged, proportioned, and combined as to produce a machine capable of making a batting or web of fur for the purpose of making fur hat-bodies with it, and for preparing furs for napping all descriptions of hat-bodies, instead of bowing in the usual manner, and for other purposes, and for the more perfect explanation of my said machine, reference is made to the drawings hereunto annexed. No. 1 and No. 2, where the several parts of my machine are distinguished from each other by letters of reference. It commences with a common carding machine, with one main cylinder, with its usual feed-apron, its feed-rollers, its lickerin. The main cylinder, marked A, has a motion of about 80 turns in a minute, and its workers and strippers, its fancy and doffing cylinder, as represented around it in dotted lines, all which is so common and so well known to mechanics as to need no further description, as it is in no way altered by me, except that the cylinders are smaller than usual, and the card-teeth are finer, and set thicker than for other purposes. I have dispensed with the comb, and have placed a *quick fancy*
199 to operate upon the doffer, by which the fur is thrown into the air in the next department of the machine, where it is formed, as hereinafter described, into a bat or web, for napping all descriptions of hat-bodies, and for making bodies to hats of fur, instead of bowing in the usual method, and for other purposes by the following machinery. The plates of the carding-machine, extending back

of the card, supported in front by two legs, and in the rear by being let into, and so supported by two upright posts, marked J and L, under the whole of which a frame or box is built, close and tight. Two rollers for supporting and moving the vellum or wire-cloth apron a, a, which rollers are marked D and E, and are placed in their bearings as represented back of the card; one of the rollers on which the driving pulley C is placed turns in boxes under the plates, and is marked D; the other roller, which is marked E, supports the back section of the vellum, and turns in boxes attached to the upright posts J and L; above the plate of the frame, said roller E, and under the plates roller D lay, having their bearings, as before described, horizontal and parallel to each other, and are at a distance of about five feet apart; the back roller E elevated about one foot above the roller D; around these rollers moves, like a feed-apron, said vellum or wire-cloth, which is endless; between the upper and lower sides of the said vellum, and extending nearly to the said rollers D and E, is placed a stationary box, (shown in section by the red lines h, h, and in perspective at V,) with the top open to receive the air that comes through the fur, and upper side of the wire-vellum; two holes are cut nigh each other through one of the plates of the frame, and through the side of the box opening into the space between the upper and lower part of the vellum; these holes being sufficiently large for the air to pass, which is drawn by the draft of a fan marked F, which fan is formed on a horizontal shaft, having its inner bearing in a box between the holes, and sustained at the other end by a post or outrigger; outside of the fan on the shaft is the pulley to drive it, marked G; the fan is formed with two heads or flanges, about four feet in diameter, made fast to the horizontal shaft, about one foot apart; between said heads are affixed four or more fans or buckets, the inner end made fast to the four sides of the shaft, extending outwards as far as the outer edge of the heads or flanges, and made fast to
200 them through the inside head or flange, and close to the shaft are cut holes between each bucket, corresponding and against the holes through the plate and box. Over the roller E, and resting on and turned by the vellum, (over which the web of fur is passing,) is a roller, H, having its bearings in the posts J and L; this roller is about four inches in diameter, and as long as roller E, having a lateral motion sufficient to harden the web; the latteral motion is given by a lever I, attached to the journal of said roller outside of its bearing; the fulcrum of said lever made fast to the upright post J, and its upper end extending upwards, and resting against the cams of the cam-wheel R, the shaded part forming a series of inclined planes, which gives the motion one way, and a spring M, bearing against the end of the journal, returns the motion in the opposite direction from the cam, thus making a reciprocal or vibratory motion; the said cam-wheel K is made fast or formed on the inside of the pulley P, and when this or the back part of my machine is thus formed, arranged and put together, and then inclosed, a vacuum or exhaust chamber is over the wire vellum into which the fur is thrown by the quick fancy; and then by exhausting said chamber by suction or draft, the fur is drawn tight upon the vellum or wire-cloth, until it passes

out with side vellum under roller H, which, by its vibratory or tremulous motion, hardens it into a web of sufficient tenacity to be handled and formed into hat-bodies, or used as napping; the motion of the machine is given by the main shaft O, which receives the bearings on the top of the upright posts marked J and L, and on one end of which is the pulley N, and on the other end the pulley P; a belt passes from the pulley N to the pulley A, on the main cylinder shaft, which gives motion to the carder; a belt on the pulley P to the pulley Y gives an increased motion to the shaft Z and pulleys S and R; a belt from pulley S conveys motion to a small pulley G, on fan F, a cross-belt from pulley R conveys a rapid motion to the pulley B on the shaft of the quick fancy, which throws the fur from the doffer into the exhaust chamber; a belt from pulley U, on the shaft of the doffer, conveys motion to the pulley T, which, by a pair of geers, conveys a slow motion to the driving-roller (No. 1) of the feed-apron; on the
201 opposite end of the roller, one is pulley Q, which, by a belt, conveys motion to pulley C, on the shaft of the roller D, which gives motion to the vellum-apron; a crossed belt on pulley (No. 2) conveys motion to pulley X, on the shaft of feeding-card; pulley W receives its motion from a pinion-wheel on the main cylinder shaft to a large tooth wheel which is made fast to the pulley W; on an outrigger a belt from pulley W gives motion to the doffer over pulley V; when all these parts are thus arranged, and the body of the machine inclosed tight, including all the cards, (except the feed-apron,) the belts may be put on the several pulleys, as represented; then pass a belt upon the driving-pulley of the main shaft, from the first mover, and all will be in motion; the fur will be received from the feeding-apron, by the feed-rollers, and be carried by the lickerin to the main cylinder, and passing all the workers and strippers, it will be received upon the doffer, and by the quick fancy will be thrown into the air or exhaust-chamber over the wire-vellum, and by the draft from the fan, drawing the air out through the wire-vellum, and by the progressive motion of the said vellum, the fur is carried off, as above described, by passing out under the division in this part of the machine, and hardened by the roller H, as above described; having described my machine, I will now state, I do not claim or describe any particular or given speed to run the cards or the vellum of wire-cloth, nor the quality of fur necessary to use, nor the quantity of fur necessary to feed on the feed-apron in a given time, but the speed and feed must be governed by the thickness of the web required and different thicknesses of web required from different kinds of fur to be used for different purposes; consequently the alteration of the co-operating parts of the machine may be varied according to the skill of the manager. I do not claim any particular number of revolving fans to exhaust the chamber of air, although I have described but one; on the one side of the chamber two or more may be applied, or one on each side of the chamber, when a more powerful draft is required. But it is necessary to regulate the draft in such a manner that the fur will be deposited equally on all parts of the vellum, when a web of uniform thickness is required, or a web may be formed thicker on one side than upon the other, or thickest in the centre, and taper-

202 ing towards both edges; these variations may be effected in different ways. A board may be placed in the inside of the box, under the vellum, in different positions to break or change the current of air as it passes through, which will cause the fur to deposit differently on the vellum; pipes may be placed leading from the inside of the box that the air passing into them and out at one end may regulate the distribution; these pipes may be perforated with holes. The quick fancy that throws the fur from the doffer will raise sufficient current of air by its rapid motion to carry the fur to the vellum with the assistance of the draft of the fan. I do not claim the fan as my invention, nor the wire-vellum apron, nor any part separately; *but I do claim as my improvement or invention* the forming the batting or web of fur, by throwing the fur into a chamber, and depositing it on an endless web of wire-cloth or vellum revolving around two extended rollers, and by exhausting said chamber of air by a revolving fan on the outside of said chamber; the air passing through the wire-cloth deposits the fur upon it, and draws it tight upon the wire-cloth at the same time the wire-cloth is forming its progressive motion, and carries the fur under a vibratory roller, which hardens it to a sufficient tenacity to be handled and formed into hat-bodies, or used for naps, and the arrangement and combination of the above machinery, and parts of machinery, in the manner above described and set forth, and for the purposes aforesaid.

THOMAS BLANCHARD.

Witnesses:
JOHN W. WYMAN.
DANIEL M. FRYE.
JAMES PALMER.

(Patented June 14th, 1837.)

203 *Copy patent and specification of Thomas R. Williams, dated April* 24, 1840.

No. 1559.

The United States of America to all to whom these letters patent shall come:

Whereas Thomas R. Williams, Newport, Rhode Island, now in London, England, has alleged that he has invented a new and useful improvement in machinery for the manufacture of stuffs in which the fibres of various materials are united with adhesive mixtures, which he states has not been known or used before his application; has made oath that he is a citizen of the United States, that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose:

These are therefore to grant, according to law, to the said Thomas R. Williams, his heirs, administrators, or assigns, for the term of fourteen years, from the twenty-fourth day of April, one thousand eight hundred and forty, the full and exclusive right and liberty of making, constructing, using and vending to others to be used, the said improvement, a description whereof is given in the words of the said Thomas R. Williams, in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

[L. S.] Given under my hand at the city of Washington, this twenty-fourth day of April, in the year of our Lord one thousand eight hundred and forty, and of the independence of the United States of America the sixty-fourth.

JOHN FORSYTH,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.
HENRY L. ELLSWORTH,
Commissioner of Patents.

204 *The schedule referred to in these letters patent, and making part of the same.*

To all whom it may concern:

Be it known that I, Thomas Robinson Williams, a citizen of the Unitd States of America, late of Nwport, Rhode Island, in the said United States, but now residing at No. 14, Lamb's Buildings, Bunhill Row, in the city of London, and kingdom of England, gentleman, have invented or discovered a new and useful invention of "a new method of combining, by means of machinery and adhesive compositions, all kinds of fibrous materials, such as cotton, silk, flax, hemp, tow, fur, wool, hair, etc., into manufactured articles, which may be applied to the purpose for which paper, pasteboard, millboard, papier-maché, parchment, vellum, leather, woven fabrics, felt, floor cloth, tarpaulin, and the skins of animals are used." And I do hereby declare that the following is a full and exact description thereof:

This invention consists in a new method, process or manner of combining fibrous materials so as to form sheets or pieces of material commonly called or known by the name of artificial skins or other articles, as hat-bodies, forms or foundations of tea-trays, boxes, and various other articles which are or may be constructed of such materials by means of machinery and adhesive mixtures.

The fibrous materials are first partially separated or opened and suspended in the air, and are then drawn upon, deposited or laid on woven wire gauze, or perforated cylinders or sheets or forms of metal or wood or woven cloth of an open fabric or net-work, such as wire gauze or perforated plates or forms, being of the requisite shape to suit the articles intended to be manufactured, and which operation is effected by means of a partial exhaustion of the air underneath or on

the opposite side of the said woven wire gauze or other fabric or perforated plates or shapes. The fibrous materials being drawn upon and caused to be deposited over the same by the currents of air passing through the said wire gauze or perforated plates or forms which arrest the fibres, and thereby form a bat, or sheet, or other shape of the said fibrous material, generally upon its upper surface, according to the shape or form of the woven wire gauze, or perforated plates or forms wherein or underneath which the exhaustion takes place. The so-laid fibrous materials are afterwards saturated in adhesive compositions whereby the combination of the fibrous materials with the assistance of pressure is completed, the fibres being principally held together by the said compositions.

In effecting these operations, some machinery which is well known may be made use of, and machinery consisting of parts and modifications of different machines well known may be combined and connected together for effecting these purposes; and I therefore wish it to be understood that I do not intend to confine myself to the precise arrangement and construction herein shown, and I shall therefore refer in the present description to such machinery as I have found to answer well for making the materials as above stated into sheets or lengths of pieces, and then allude to the further modifications of this novel method of combining fibrous materials in the process of making hat-bodies or other articles. And it may render the subject of this invention more clearly understood by observing that this new method or process of combining fibrous materials is in contradistinction to the present mode of reducing fibrous materials into a state of pulp suspended in the water, as is done in the manufacture of paper. Also to the process of spinning and weaving, as in woven fabrics, and also to the ordinary process of felting, as furs, wools, hairs, and other animal substances are usually felted together. And I shall now proceed to describe the manner in which the said invention is performed or carried into effect, referring to the annexed drawings, which are different views of machinery or apparatus now in operation for making the said materials first in sheets or lengths.

Fig. 1 is a side elevation of the machinery or apparatus complete.

Fig. 2 is a vertical section taken longitudinally through the same.

Fig. 3 is a plain or horizontal view; the red arrows in all these figures indicating the passage of air through the apparatus, and the blue arrows that of the material under operation, and the black arrows the direction in which the various straps or bands and wheels or cylinders revolve or travel. *A A* is the frame-work of the machinery, which, in this instance, is formed of cast iron, closely cased or panneled, air-tight, or nearly so with wood; *b b*, on all sides excepting the underneath, the feeding apparatus, which is open for the admission of the atmosphere; *c c* is the endless feeding-belt upon which the fibrous material, as hemp, tow, flax, refuse, silk, cotton, etc, is spread evenly by hand in the ordinary manner. The feeding-belt, in this instance, is composed of two endless leather straps, one at each side, passing over the rollers *d d*. The leather straps are connected together by rods or bars of wood, having spaces between them for the purpose of allowing any dirt or other extrane-

ous matter, mixed in the materials, falling through the same without being carried into the machine; *e e* are a pair of feeding-rollers which take the fibrous material from the feeding-belt and present it to the action of the teeth of the opening cylinder f, (commonly called the "Devil cylinder.") The upper feeding-roller is pressed upon the lower one by weighted levers and rods at *g g*, and these rollers are made to revolve by means of toothed pinions on their ends, as shown in the drawings, which is set in motion by a strap or band, *h*, passed over a pulley on the axle of the lower roller from any convenient part of the machinery. From one of these pinions an intermediate toothed wheel gives motion to another wheel on the end of the roller *d*, thereby causing that roller to revolve, and with it the endless feeding-belt. The axle of the Devil cylinder f is mounted, turning in proper bearings in the frame-work, and the cylinder is constructed of iron arms and rims covered with blocks or staves of wood, through which are driven a great number of iron or steel spikes or teeth, which project from the periphery of the cylinder very near to the feeding-rollers *e e*. This cylinder has a very rapid rotary motion given to it by means of a band passed from the main driving-shaft over the pulley or rigger *h* on its axis. The feeding rollers bring the material into the machine, and the teeth of the cylinder separate or open the fibres, throwing the material into the air, as shown by the blue arrows, where, meeting with the current of air caused by the partial vacuum produced within and under the receiving cylinder *i*, the loosened
207 fibres are drawn on to and deposited upon the periphery of this cylinder in the form of a thin layer, sheet, or bat of fibrous material, from whence it is taken by the receiving rollers *k k*, as hereafter described. The cylinder *i* is formed of iron arms or rims, covered with an endless cloth of woven wire gauze, perforated zinc or iron or tin plates, or other material or fabric, which will allow of the passage of the air through it, but at the same time stop or arrest the fibrous substances mixed with or suspended in the air. The cylinder *i* and the receiving rollers *k k* have a slow, uniform, rotary motion given to them by means of a band passed from a rigger *l* upon the auxiliary shaft to the rigger *m*, upon the axle of which is a toothed pinion taking into gear with a toothed wheel *n*, mounted upon the axle of the lower receiving roller k, and upon this axle is a pinion taking into an intermediate wheel *o*, the teeth of which take into gear with another wheel *p*, mounted upon the end of the axle of the cylinder *i*, and thereby give it a slow rotary motion in unison with that of the receiving rollers *k k*.

The partial vacuum or exhaustion of the air is produced within and under the cylinder *i* by means of the rotary fan or exhauster at q, or any other exhausting apparatus, but which in this instance, for simplicity of application, is shown placed under, and in direct action with the cylinder *i*, within an air-tight box or casting *r*. The fan is made to revolve rapidly by bands passed over riggers in any convenient manner, but when several of these machines are placed in a row on one floor of a building, I prefer connecting the exhauster with an air-tight trunk situated underneath the floor, extending the whole length of the machines, and exhaust the air therein by means of a

large fan or blower, situate at one end of the trunk or in any other convenient part of the building; a space around its centre, as shew in the drawing at *u u*, being open to the trunk, and its periphery open to the atmosphere.

The extent of surface of the periphery of the cylinder *i*, through which the air is allowed to pass, is determined by the shield or partition *s s*, which is placed as a guide for the current of air therein, and is packed against the cylinder *i* at *t*, by means of leather
208 or other suitable substance, in order to prevent the air and fibrous materials passing between it and the cylinder. The lower receiving roller is placed nearly in contact with the opposite side of the cylinder, and does not require packing. The receiving rollers *k k* are connected together by means of pinions on their ends, and the upper one is pressed down upon its companion by weighted levers and rods, k k, and as they receive the sheet-layer or bat of fibrous materials from the cylinder *i*, they press it into a more compact body and deliver it to the apparatus, where it is to be saturated with pitch and tar, or other resinous or gelatinous or adhesive compositions, as shown in the drawings at fig. 4; *v v* are two hollow cast-iron cylinders or rollers mounted in proper bearings in the framing *w w*, and are warmed, when required, by means of hot iron heaters, or in any other convenient manner; *x x** are troughs containing the adhesive mixture or composition, which is kept fluid by the radiant heat from the rollers; *y* is another trough containing the same composition for the purpose of supplying the lower one *x**. The lower cylinder *v*, being partially immersed in the composition, carries up with it a sufficient quantity to saturate the under side of the sheet or bat of fibrous materials, and the composition in the trough *x*,* being in direct contact with the sheet or bat, saturates the upper side as it passes under it. The upper heated cylinder is pressed upon the lower one by means of weighted levers at *z z*, and as they revolve they not only squeeze or force the composition or adhesive mixture through the sheet or bat, but also press out all that may be superfluous, which again runs into the lower cistern *x*. These rollers also press the sheet or bat of fibrous materials, so saturated, into a thinner or more compact body, and the composition immediately cooling, retains the fibres in that state; and as the sheet of material cools it may be cut into any convenient sizes for the purposes required, or continued onwards into succeeding operations, to be afterwards described. I should here remark that the adhesive mixtures generally used in this part of the process is about three parts of pitch or rosin with about one part of tar, to which is added, perhaps, a thirtieth of oil or tallow, but the proportions necessarily vary for the different purposes for which it may be intended.

209 The cylinders *v v* are made to revolve by means of a band passed from a rigger on the auxiliary shaft to the pulley 1, placed upon the axle 2, which is mounted in the frame-work 3. Upon this shaft is a toothed pinion 4, taking into the wheel 5, upon the end of the axle of the lower roller *v*, the upper one being turned by a pair of pinions upon the ends of the shafts of the rollers.

Having now described the means of carrying this invention into

effect in the making of sheets or lengths of fibrous materials which are applicable to the sheathing of ships, covering the roofs of buildings, floor cloth, packing for the chairs of rails for railways, tarpaulins, and other purposes, I will proceed to describe another application of this invention for the manufacture of millboards for book-binding, making boxes, and packing for flanch joints in pipes and joints, for tanks, and machinery in general. For this purpose I make use of an additional machine, fig. 5, appended to that last described, through which the endless sheet, after leaving the pressing rollers *v*, is conducted over the roller *b*, (receiving a motion from the band c,) and from this it descends into the cistern D, which is filled to the line *d*, with a composition of weak size mixed with paste and clay in different proportions, (according to the material required,) through which it is made to pass over and under the rollers *e e e*, by the drawing of the two larger geared rollers E E, which are covered with a coarse wollen or hair cloth, and gently press out (by means of the weighted levers *f f*) so much of the superfluous composition as may be wished. It is then continued over the roller *g*, and is afterwards cut off into various lengths and hung up to dry, it being finished when dry by the usual methods of glazing or finishing millboards or cardboards, by rolling or pressing.

The rollers E E receive their motion by a band from an auxiliary shaft under the floor, or in any convenient situation.

The advantage of thus super-saturating the previous sheet with this composition is to prevent the action of heat upon the so manufactured boards.

The forms may be made of any perforated substance of sufficient strength, but I prefer them of copper, zinc, or wire gauze.

210 Having thus fully described my method of combining by means of machinery and adhesive compositions all kinds of fibrous material for the manufacture of various articles, I do hereby declare that I do not claim the forming of a bat or sheet from fibrous materials in the manner set forth; nor do I claim the machinery employed for the saturating of such a bat or sheet of fibrous materials with resinous and other substances. But what I do claim as of my invention to secure by letters patent is the so combining and arranging the machinery employed substantially in the manner herein set forth as that the processes of forming the bat, and of saturating the same with the different compounds, shall be simultaneously and consecutively effected so as to form sheets or lengths of fibrous materials applicable to various purposes.

In witness whereof, I, the said Thomas Robinson Williams, have hereunto set my hand and seal this twelfth day of February, in the year of our Lord one thousand eight hundred and forty.

THOS. R. WILLIAMS. [L. S.]

Witnesses:
JOHN CLARK,
GEORGE HARRIS,
Draftsmen to Messrs. Newton & Berry, 66 Chancery Lane, London.

211 UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered, that on this eleventh day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner, duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States Court Buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Charles St. John, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits. And the said Charles St. John, being about the age of sixty years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy aforesaid, I did carefully examine the said Charles St. John, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Charles St. John; sixty years of age; reside in New York, and am not engaged at any business at present.

Q. 2. Are you the Charles St. John who at one time was interested in the Wells patent for hat-body machines?

212 A. I am.

Q. 3. Have you ever been engaged in the hat business; and if yea, how long was you engaged therein, and where? and give us some idea of the extent in which you were so engaged.

A. I have; I commenced in 1823, and continued at the business, with the exception of two years, till 1845. I was, from 1823 to 1837, in Broadway, in the retail business. From 1840 to 1845, in the wholesale business in Water street. My retail business, during the time I was in Broadway, amounted to from $125,000 to $150,000 a year. Our wholesale trade amounted to from $200,000 to $225,000 a year.

Q. 4. How did your business compare in extent with that of others in the same kind of business during that time?

A. My retail business probably was about one-third more than any other house; I can't tell exactly. I had the lead in the retail trade.

As it regards the wholesale, I expect there were others that done a great deal more than we did; I can't tell how much.

Q. 5. How were hat-bodies formed prior to 1845?

A. They were bowed by hand; that is, the principal portion. There was a Blanchard machine wound the bodies from the web, but there were very few of them used.

Q. 6. Was the Blanchard machine the first machine you knew of which was used in making fur hat-bodies?

A. That machine did not make fur hat-bodies exclusively, that I ever heard of, but a mixture of fur and wool to make a web.

Q. 7. Who used the Blanchard machine in making hat-bodies?

(Objected to.)

A. I was not personally acquainted with the use of that machine; I only used bodies that were made by it; I only used a very few; they wouldn't work for my retail trade.

Q. 8. Do you know of any other machine being introduced into the country for forming hat-bodies; and if yea, what machine?

A. I never knew of any other that would make hat-bodies well but this Wells machine.

Q. 9. Do you know of the introduction of the Wells machine for forming fur hat-bodies?

213 A. Do you refer to machines for making fur hat-bodies? for machines for making wool hat-bodies were made long before.

Q. 10. The question is limited to the making of fur hat-bodies. Please answer it.

A. Yes, sir.

Q. 11. What effect has the introduction of that machine had upon hand-bowing?

(Objected to.)

A. The hand-bowing process, I suppose, is scarcely known now, compared with what it used to be.

Q. 12. How much, if any, has the use of Wells's machine cheapened hats?

(Objected to.)

A. Well, probably from ten to twenty-five per cent.

Q. 13. State whether the Wells machine was the first machine introduced into practical operation in this country, in forming fur hat-bodies, except the Blanchard machine, which you say you think formed a web of mixture of fur and wool?

(Objected to.)

A. It is the first one.

Q. 14. Have you had an opportunity of knowing whether any machine has been introduced into England for forming fur hat-bodies?

(Objected to.)

A. Yes, sir.

Q. 15. What machine has been introduced in England for forming fur hat-bodies?

(Objected to.)

A. The Wells machine.

Q. 16. State whether the Wells machine was the first one introduced in England for forming fur hat-bodies?

(Objected to.)

A. To the best of my knowledge, it was.

Q. 17. Have you at any time visited England with reference to the introduction of the Wells machine; and if yea, when?

(Objected to.)

A. I have; in March, 1853.

Q. 18. Was there any machine then in use there, for forming fur hat-bodies?

214 (Objected to.)

A. There was not.

Q. 19. Who was the largest manufacturer of hats at that time in England?

(Objected to.)

A. The Messrs. Christys of London; they had several establishments, I believe. They were the largest manufacturers in England.

Q. 20. Did you try to have the Christys adopt the Wells machine for forming fur hat-bodies?

(Objects to.)

A. I did.

Q. 21. Did you at any time receive a letter from the Christys, giving reason why they did not at that time adopt it? and if yea, produce the letter to the examiner, and let it be marked as an exhibit?

(Objection to the introduction of the letter.)

A. I did receive a letter from them, which I now produce, and which is marked "Exhibit C."

Q. 22. State whether or not, if you know, the Christys have since the date of that letter, adopted the Wells machine under a right procured from the owners of the English patents, and who the owner was.

(Objected to.)

A. They have adopted that machine for making hat-bodies. It is under a right procured from the owners of the English patent. Henry A. Burr and Israel D. Condit were the owners, I believe.

Q. 23. Are you sure that Condit had an interest in the English patent at the time the Christys obtained their right?

(Objected to.)

A. I cannot speak positively on that point. My impression is that he had. I don't know.

Q. 24. Did you at any time visit France with reference to the fur hat-body machine; and if yea, at what time? and state whether there was a Wells machine then used there.

(Objected to.)

A. I went to France in 1852. There had been a Wells fur

215 hat-body machine sent out the year before. The agent, Mr. Dyer Ames, took out a machine for a company who had purchased the right, but he being unacquainted with the business of making hats, he licensed the machine to Laville & Pomereau, hatters in Paris. They run the machine for one year at a price at about one-half the cost of running, which brought the machine heavily in debt to the owners of the patent. There was no other machine run there until I went out. That machine was running when I went out.

Q. 25. Did you find any machine in use for forming fur hat-bodies in France, when you went out, except that one Wells machine?

(Objected to.)

A. They built some other machines of the same kind during that year, which were also running when I went out. I mean by "they," Laville & Pomereau.

Q. 26. Were there any machines in use in France when you went out, forming fur hat-bodies, except the Wells machine which Laville & Pomereau had?

(Objected to.)

A. There was not.

Q. 27. Please explain in what way the use of the Wells machine has cheapened hats?

(Objected to.)

A. In the first place, one machine, with about four hands, would make from three to four hundred hats per day in ten hours, which hands should not necessarily understand the business in learning the trade—take raw hands, anybody—and the machine would not occupy probably not more than ten feet square of room to make that number of hats. It would take thirty to forty hands, I should judge, to make the same number of hats, and a room perhaps six times as large; and these hands must thoroughly understand the trade of making hats, at about double the price of those made by machine. The machine also worked stock that can not be worked by hand, and the machine work being much more perfect, gives a decided preference over hand labor.

Q. 28. You say that it would take from thirty to forty hands to do the work of one machine with four hands. By what mode of forming would it require the thirty or forty hands?

216 (Objected to.)

A. By the hand-bow.

Q. 29. How is it as to there being a saving by the machine using less stock than in hand-bow forming, in making a hat-body?

A. All the stock is saved entirely by the machine, and it makes the body more even and thinner than in bow forming, and less stock used in making it.

Q. 30. Are hats made of light bodies usually preferred by consumers?

A. They are decidedly so.

Q. 31. Why?

A. They are pleasanter to the wearer.

Cross-examined by Mr. Harding, counsel for defendants.

X. 32. When did you first become acquainted with the Wells machine?

A. I think it was in 1845.

X. 33. Describe the machine as you saw it first.

A. It was a very rude machine when I first saw it. The frame was made of wood. It had a feed-table to pass the fur between two rollers, having brushes on them, into a form something like an inverted V. It was a conductor or trough, with a hood on one end of it, to distribute the fur upon a rotary cone, which cone was perforated,

and an inverted fan in the inside of it for the purpose of holding the fur on this cone by suction in connection with the current of air passing through this trunk, the current being formed by the pickers next to the feed-table by a very swift motion of the feeder. The fur was thrown by a revolving brush.

X. 34. How was the hood-piece at the end of the conductor operated?

A. By the hand.

X. 35. Specify more minutely.

A. By moving this hood up and down, you could distribute the fur at your pleasure on the cone to form a hat-body.

X. 36. State how often it was moved up and down.

A. That depended upon the weight of body you was forming; a very light hat—say one, one and a half, or two ounces—
217 the hood would have to be moved perhaps twice up and down; so in proportion to a heavier body. If the body was four ounces, it would have to be moved up and down three times, or three and a half times.

X. 37. What was the effect of moving this hood up and down on the fur as it issued from the trough?

A. We always called this trough a trunk. The effect was to place the fur on the cone when it was necessary to be put to form a perfect hat-body.

X. 38. Explain to me how this hood, being worked up and down, distributed the fur.

A. The brim and band of the hat being necessary to be heavier than other portions of it, we could throw the fur there by this hood; that is, on the brim and band.

X. 39. Did the workmen who tended the hood have to watch the cone as the fur deposited, in order to determine when and how much fur to throw on the brim and band by means of the hood?

A. Yes, sir.

X. 40. Did you ever see this hood worked by machinery instead of by the hand?

A. I don't recollect of seeing it worked by machinery; it might have been worked by machinery as an experiment, but not long.

X. 41. Do you remember the improvement which H. A. Burr and A. B. Taylor made on this machine?

A. I do.

X. 42. What was that improvement?

(Counsel for complainant here gives notice to the counsel for defendants that the witness was not called or examined in chief as an expert, and is not a machinist, and that any examination which the counsel for the defendants examines the witness as an expert, he must do it as an examination in chief on his part, and by making the witness his own.)

A. The improvement was made for the purpose of doing away with that hinged hood: and by opening and closing the top of this trunk, we could form a body without the use of the hood.

218 X. 43. Was this improvement patented, and by whom?

(Question objected to, because the patent itself is the proper evidence of what was patented, and because an answer to the question

in the affirmative or negative would require the witness to construe the claim of the patent, which is matter of law and for the court to do, and because, also, it requires the witness to speak as an expert in giving his answer.)

A. It was, by Burr and Taylor.

X. 44. After the improvements of Burr and Taylor had been made to the Wells machine, was the Wells machine or the Burr and Taylor machine adopted and used by the firm composed of yourself, Henry A. Burr, and A. B. Taylor.

(Objected to, for the reason that inasmuch as the so-called Burr & Taylor improvement was on the Wells machine; there was not any Burr & Taylor machine independent of, or distinct from, the Wells machine, and the question assuming the contrary is calculated to deceive and mislead the witness.)

A. We used the same machine with the Burr & Taylor improvements.

X. 44. Was the Wells hood used after the Burr & Taylor improvement was made?

A. Not that I know of.

X. 46. Were there not other improvements made by Burr & Taylor besides substituting the arrangement of the extremity of the trunk, which you have described, instead of the movable hood?

A. I know of no other improvements made on that machine, except the admission of air under the feed-table to form a current of air, in connection with the rotary brush, which was necessary to form a hat-body.

X. 47. Do you now refer to the movable valve put under the feed-table at the entrance of the trunk?

A. That is what I mean.

X. 48. Was the machine which you introduced into England the machine as improved by Burr & Taylor?

A. It was.

219 X. 49. You refer to the machine which you introduced as being patented in England. In whose name was it patented?

A. I don't know the date of the patents nor in whose name they were patented personally, except the first Wells machine.

X. 50. Was not Mr. Newton the agent for the patents in England?

A. I do not know.

X. 51. Did you ever see the English patents to which you have referred?

A. I don't recollect having ever seen it.

X. 52. How do you know that there was a patent in England of this machine of which you have spoken?

A. The patent will speak for itself.

X. 53. Where is it?

A. I don't know.

X. 54. Why did you say the machine was patented in England?

A. My partner, Mr. Burr, who always had charge of that department, and Mr. Keller, who was the attorney, often stated to me that the patent from England had been received; but I never took the pains to look at it, and can't say whether I ever saw it or not.

(Mr. Harding requests counsel for the complainant to produce this copy of the patent referred to in the examination in chief by the witness, in order to show what was patented in England. The witness having stated that the patent will show what was patented, Mr. Harding requests Mr. Gifford to lend him the patent, in order that he may continue the cross-examination of the witness.

Mr. Harding inquires whether Mr. Gifford will make any reply to his request.

Mr. Harding now having waited some time, and Mr. Gifford making no reply, he inquires of Mr. Gifford whether he is to imply from his silence that he does not mean to reply, or whether he is silent from any other cause.

Counsel for the complainant here objects to incumbering the record with speeches of counsel, it being improper and contrary to the
220 usual practice in courts of equity, and says that he shall advise the complainant not to pay the examiner for writing down any such speeches. If either party desires the production of a document in the possession of the opposite party, there is a proper way of giving notice for the production of it without encumbering the depositions with anything of the kind.

Mr. Harding states that having now served a formal notice on Mr. Gifford to produce the English patent referred to in the examination in chief, he proposes to adjourn to the further cross examination, to enable Mr. Gifford to produce the paper.

Mr. Gifford hands to Mr. Harding an English patent to William Edward Newton, dated 29th January, thirteenth year of the reign of Queen Victoria. "for improvements in machinery or apparatus for making hat-bodies and other similar articles," being for a communication from abroad.

Mr. Harding requests permission, at his own expense, to annex a copy of this patent, now produced, to this record, and also requests Mr. Gifford to produce a copy of the specification which accompanies said patent, a duplicate of which was enrolled or filed in the patent office in London. I mean any copy of said specification whatever which may be in possession of the complainant or his counsel.

Mr. Gifford says that he has just sent for the English patent which he has handed to Mr. Harding, and Mr. Harding is welcome to the use of it to make a copy, which copy he may make any proper legal use of he desires; but that specifications do not accompany English patents from the authorities which issue them, and he is not aware that complainant has a copy, or any of his counsel, but thinks that Mr. Harding can conveniently find a copy printed and accompanying the English patents as they are printed in England, and he begs that Mr. Harding will not delay the examination any longer upon that subject.

Mr. Harding offers in evidence the printed copy of a specification of William Edward Newton, of January 29th, 1850, (thirteenth
221 year of the reign of Victoria,) published at the great seal patent office in England, marked Exhibit 6.

Counsel for complainant offers to stipulate upon this copy of English specifications, that the defendants may use it in evidence in these suits,

as he has done with the copies of several other printed English patents.

Counsel for the defendants accepts the offer.)

X. 55. What interest have you had in the Wells patent, and how long were you connected with it?

A. I had one-third interest in it from the date of the patent, and this interest continued for about nine or ten years.

X. 56. During what length of that time was the Wells hood used in connection with the machine?

A. I can't tell the exact time. I should think two or three years.

X. 57. Were you interested in the English patent?

A. I was.

X. 58. In what way, and to what extent?

A. The same as the patents here.

X. 59. Who were interested in the English patent, and in what proportion?

A. Henry A. Burr, one-third; A. B. Taylor, one-third; and Charles St. John, one-third.

X. 60. What was realized from this patent?

A. Mr. Christy paid $10,000 for one-third of it. That was all that was ever realized from it. The patent had nearly run out when he purchased it.

X. 61. When did he purchase it?

A. About two years ago.

X. 62. Why did you call the machine which you introduced in England the Wells machine, in your examination in chief?

A. It was generally known as the Wells machine by the trade.

X. 63. Was not that machine frequently called the Burr machine?

A. It might have been so. It was known generally, as I stated before, as the Wells machine. I have heard it called the Burr machine.

222 X. 64. Do you know why the claims of your patent in England are less extensive than the Wells patent in this country?

(Counsel for the complainant objects to the question on the ground that the witness is neither an expert in the law governing the claims of patents or in machinery, and the question requires him to answer it in both capacities if he answers it at all.)

A. From personal knowledge I don't know anything about it; I don't know that they are less.

X. 65. What did you pay to Mr. Wells for the interest in the American patent which you owned?

A. When I bought the one-third interest the patent was not granted. I paid $4,000 for one-third interest in the invention.

X. 66. Is that the only interest you ever purchased?

A. Yes, sir.

X. 67. Who did you buy that of?

A. Mr. Wells.

X. 68. Did you pay him this in money?

A. Certainly.

Direct resumed.

Q. 69. You have mentioned, on your cross-examination, that the Christys gave $10,000 for a third of the English patent. Do you know whether or not they were to pay also a certain amount of tariff for hat bodies made by any machine beyond two machines?

(Objected to.)

A. They were to pay a penny sterling on each hat-body made on any machine over two machines which they might run.

CHARLES ST. JOHN.

Subscribed and sworn to before me this 11th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

223 LONDON, 35 GRACE CHURCH ST., *4th Aug.*, 1853.

ST. JOHN, Esq., New York:

DEAR SIR: Previously to your leaving for New York, we wish to state to you the strong sentiments we entertain of the fairness with which you have put before us the proposition to purchase your patent in the forming machine for hat-bodies. There are at this moment many reasons why we should not just now like to encounter our men and their opposition. We have, besides, only just made a settlement with them relative to wages, and as the demand for felts (made in part of lamb's-wool and part fur) is very brisk, and the combination of the workmen considerable throughout the process, we do not think that the very small advantage in wages which (even if we used all fur, to which process alone we consider your invention is applicable) it would give us would make it prudent to hazard any turn-out just now. In our country, as we fully explained to you in our numerous interviews, we have a great redundency of hat-making labor; and as such is the case, our inclination does not go very much towards lessening the amount of employment of men whose wages ordinarily are very low, but who just now, from an excessive demand, are still contented with a moderate advance.

Under these circumstances, notwithstanding the great urbanity and frankness and assiduity which you have throughout manifested in endeavoring to dispose of this machine, we must, as we before said, take a little further time to consider it. In France and the United States things are very different, and the employment for all fur bodies much greater than with us.

We shall house and insure your machinery with great pleasure for you, without any charge, until we hear from you. And again, thanking you for your frank and courteous manner and offer, we are very truly yours,

J. T. & E. CHRISTY & CO.

"Exhibit C."

R. E. S., *Examiner, etc.*

224 UNITED STATES OF AMERICA,
Southern District of New York,
City, County and State of New York, ss:

Be it remembered, that on this eleventh day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner, duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled, 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States Court Buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Israel D. Condit, to testify and the truth to say, on the part and behalf of the complainant in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, Henry W. Duryee, are defendants in each of said suits.

And the said Israel D. Condit being about the age of fifty-nine years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Israel D. Condit, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Israel D. Condit; fifty-nine years of age; reside at Milburn, Essex county, New Jersey; and am a former of fur hat-bodies.

Q. 2. Have you formed hat-bodies by machinery, either alone
225 on your own account, or in connection with partners; and if yea, when did you commence, and with what machine did you commence?

A. I commenced the manufacture of fur hat-bodies in the fall of 1836. I commenced the hat-body business in 1829, with wool hat-bodies, to form them on machinery, on what is known as the Grant patent former.

Q. 3. How long did you continue to form wool hat-bodies, and when did you commence to form fur hat-bodies by machinery?

A. I formed wool hat-bodies from 1829 up to a period of within three or four years of the present time. I commenced to form fur hat-bodies by machinery in the fall of 1836.

Q. 4. With what machine did you commence to form fur hat bodies in the fall of 1836?

A. With a machine known as Blanchard's machine.

Q. 5. How long did you continue to use the Blanchard machine?

A. From the time we commenced we were three or four years before we got it in fair operation. We used it up to the time of adopting the Wells improvement, which was, I think, to the year 1845, but could not say positively.

Q. 6. Why did you discontinue to use the Blanchard machine?

A. There were two principal reasons. One was, that the work was not of as good a quality, and cost a great deal more to make the hat-bodies than they did on the Wells machine.

Q. 7. What was the pecuniary consequence to you or your friend of running the Blanchard machine and then giving it up, on the introduction of the Wells machine?

(Objected to.)

A. There was a loss of some sixty or seventy thousand dollars.

Q. 8. Did the Blanchard machine form flat bats?

A. Yes; it formed a continuous web with a flat surface.

Q. 9. How was the flat web formed into a conical shape?

A. It was placed before a former similar to the wool-body former, and web was wound on to the cone.

Q. 10. Did you use your wool hat-body machines to wind the flat fur-bats on?

226 A. We used a machine very similar to the wool-body machine.

Q. 11. After the flat endless web of fur was formed by the Blanchard machine, what was next done with it?

A. It was taken from what we called the web-machine, and placed before this former.

Q. 12. How was it taken—by hand, or how otherwise?

A. By hand.

Q. 13. Was it taken immediately from the Blanchard machine to the former, and wound on the cone?

A. Yes; it was.

Q. 14. Were the cones on which it was wound perforated or not?

A. They were not perforated.

Q. 15. How did hat manufacturers receive or like bodies formed of bats made on the Blanchard machine?

A. They were prejudiced against them.

Q. 16. State whether or not they complained, or found fault with their quality.

(Objected to.)

A. The trade objected to the use of them, and we never could introduce them generally.

Q. 17. Did you ever form any hat-bodies on the Blanchard machine for Rankin, Duryee & Co., of Newark, or endeavor to get them to have you form hat-bodies on that machine for them?

A. We did form bodies for them, and made great efforts to get them to adopt the use of them.

Q. 18. With what result did you do that?

A. We failed to get them to adopt them.

Q. 19. Why?

(Objected to.)

A. They complained that they were not properly laid.

Q. 20. Are any of the persons who were members of the firm of Rankin, Duryee & Co., among the defendants in these suits?

A. Mr. Duryee, who is now one of the defendants, was then a member of the firm of Rankin, Duryee & Co. I mean Peter S. Duryee.

227 Q. 21. Did you run the Blanchard machine alone, or in company with some one; and if the latter, what was the name of the firm?

A. We run it in company. The firm was Condit & Co.

Q. 22. Was the Blanchard machine used by any parties besides Condit & Co?

(Objected to.)

A. Not to my knowledge.

Q. 23. Would you have been likely to have known it if any one else had used it?

A. I think I should.

Q. 24. Was there any other machine used in forming fur hat-bodies, except the Blanchard machine, at the time of the introduction of the Wells machine?

(Objected to.)

A. Not that I ever heard or knew of.

Q. 25. What effect or result has the Wells machine produced in the manufacture of hats?

(Objected to.)

A. It has perfectly revolutionized the whole trade. The result has been to increase the consumption and cheapen the cost. I mean the consumption of fur hats.

Q. 26. In what way have the Wells machines cheapened the cost of fur hats?

(Objected to.)

A. By the great facility in producing the quantities, and at a much less cost of labor, and by the use of the raw material that could not be well used by hand work.

Q. 27. How as to the quantity of fur used in forming the bodies as between the machine and the old hand work?

(Objected to.)

A. I think the product is greater by machine than by hand work.

Q. 28. I mean the quantity of fur used in forming a hat-body as between machines and hand-work. Which makes the lightest body?

(Objected to.)

A. The weight of the body is determined by the quantity of material in it. In my last answer I meant to say it requires less fur to make a hat-body by machinery than by hand labor.

228 Q. 29. How as to the requisite qualification of the workman between those attending to the machine and hand-bowing?

(Objected to.)

A. Hand labor requires skilled workmen. By machinery we use ordinary labor. What I mean by that is, that we use those who have not been trained or served at the business.

Q. 30. How do the prices for forming hat-bodies, which you now charge in using the Wells machine, correspond with the prices that Condit & Co. formerly charged for forming them by the use of the Blanchard machine?

(Objected to.)

A. About forty or fifty per cent. less by the Wells machine.

Q. 31. State whether the Wells machine has lowered the price of hats.

A. It has lowered the price of hats.

Q. 32. How much, according to your judgment and experience?

A. Well, I should think twelve or fifteen per cent.

Cross-examined by Mr. Harding, counsel for defendants.

X. 33. When did you first see the Wells machine in operation?

A. I can't state exactly the time. I have already stated I thought about 1845.

X. 34. How was Wells's hood worked when you first saw it?

A. I don't know that I can give any better answer than I have. As the model is now.

X. 35. Who worked the hood on the Wells machine when you first saw it?

A. Well, I don't know as I ever saw it worked.

X. 36 Did you ever use a Wells machine with a hood on it?

A. No, sir.

X 37. Did you visit the defendants' factory in company with the complainant and Daniel Barnum?

A I did.

X. 38. When?

A. The time I don't recollect.

X. 39. What year?

A. Well, I should think it was about a year ago, more or less.

229 X. 40. Was Mr. Keller with you?

A. I think he was. He was there.

X. 41. Look at Exhibit A, and state whether that is like one of the machines you saw there.

(Objected to, on the ground that this witness is not a machinist, and is not an expert, and is not called by the complainant as an expert, and was not examined in chief as an expert; and if the defendants' counsel insists upon an answer to the question, he must do it by making the witness one of his experts, and take the answer as an examination in chief on the part of defendants.)

A. It looks to me like a model of the machine I saw there.

X. 42. Did you go upon the invitation of the defendants?

A. I went there with Mr. Burr, and was invited in to see the machine by Mr. Jaques, one of the defendants.

X. 43. Was the machine run before you?

A. The machine was running in my presence.

X. 44. How much did you get for making a hat-body—the average price on a Blanchard machine?

A. We got from 12 to 25 cents.

X. 45. What would these bodies cost made by hand?

A. The price for making what we charged 25 cents for was three shillings by hand, which was about 33 per cent. less than the price of hand-made.

X. 46. How many fur hat-bodies do you suppose you have made?

A. I couldn't say. We have made a good many thousands.

X. 47. What did you pay for the right to use the Blanchard machine?

A. I paid $20,000 for the patent.

X. 48. Have you not made some improvement on the Wells machine?

A. I have a patent for the application of cards on the cylinder, which receive the fur from the feed-rollers, and then flung off the cards by a brush.

X. 49. Do you think it an advantage, in employing carding cylinders, to act upon the fur preparatory to its being thrown by the brush in the trunk on your Wells machine?

230 A. I don't know that there is any advantage in the action produced upon the fur. The advantage is, we think we can make it work faster and make more work.

X. 50. Why?

A. We think we can feed the fur faster into the trunk with the cards than without.

X. 51. How long have you used this improvement in connection with the Wells machine?

A. Ten or twelve years on all my machines.

X. 52. How does the brush move the fur from the carding-cylinder?

A. By running in contact with it.

X. 53. Does it bend the card-teeth?

A. No.

X. 54. Why?

A. There is not force enough applied to injure the cards. The card-teeth are always bent.

X. 55. Does the elasticity of the brush enable it to remove the fur without injuring the card-teeth?

A. It does.

X. 56. What is the date of your patent?

A. I can't say from remembrance. Perhaps three years after the Wells patent. It was granted to Edward Condit and a Mr. Taylor.

Direct resumed.

Q. 57. If I understand you with respect to what you say, you have added to your Wells machine—it is a cylinder covered with card-teeth, interposed between the feeding-rollers and the brush. Am I right?

A. That is right.

Q. 58. About how many revolutions, in ordinary operations, does that cylinder make?

A. I couldn't state. It runs rapidly—perhaps 200 or 300 revolutions per minute.

ISRAEL D. CONDIT.

Subscribed and sworn to before me this 11th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Adjourned to 10 a. m. the 12th instant.

231 UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this twelfth day of September, in the year of our Lord one thousand eight hundred and sixty one, I, R. E Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,' " passed March 1st, 1817 and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Samuel G. Starr, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersy, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits ; and the said Samuel G. Starr being about the age of forty-seven years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Samuel G. Starr, and he did thereupon depose, testify, and say as follows, viz :

Q. 1. What is your name, age, residence, and occupation?

A. Samuel G. Star ; forty-seven years of age ; reside in Brooklyn, and am a merchant.

Q. 2. Are you engaged in the hat business, and in what capacity, and how long have you been engaged in it? and state whether individually, or as a member of a firm.

232 A. I am, At present I am engaged in selling hats. I have been engaged in manufacturing and selling hats for over thirty years. I am at present a member of the firm of Star & Underhill, of this city.

Q. 3. Give us some idea of the extent of your business in manufacturing hats.

A. Our sales, within the last six years, have been between two and three hundred thousand dollars a year, on an average.

Q. 4. How do you have your hat-bodies formed, by machinery or by hand-bowing?

A. We have had them almost all formed by machinery.

Q. 5. How much less do you sell hats now, the bodies of which are

formed by machinery, than you could afford to sell them if you had the bodies formed in the old way of hand-bowing?

(Objected to.)

A. I should judge from ten to twenty-five per cent.

Q. 6. Who forms your hat-bodies by machinery?

A They have been mostly formed by H. A. Burr.

Q. 7. State, if you please, some of the advantages, that is, the items of advantage, in machine forming.

(Objected to.)

A. One advantage is in making a better hat out of the same stock than they made by hand; also in using kinds of stock that they were not in the habit of working in hats by hand. This applies more particularly to low-priced hats, of which many are made with a proportion of stock not worked at all previous to the introduction of these machines. Also, in being able to carry on the manufacturing business to a larger extent with less room. Also, in producing a hat more even and of lighter weight than they were in the habit of making them by hand.

Q. 8. How, as to the saving of labor, and the carrying on of a given amount of business with less capital, when the forming is done by machines?

(Objected to.)

A. When the forming is done by machines, the manufacturer employs less number of hands than he would require if the bodies were made by hand, and would therefore require very much less
233 room, and in that way it would be a saving in the expense of manufacturing. It would require less investment for the same amount of business.

Cross-examined by Mr. Harding, counsel for the defendants.

X. 9. Have you been engaged continuously in the hat business?

A. Almost the entire time.

X. 10. In what else have you been engaged?

A. I have been engaged in no other kind of business.

X. 11. Of your own knowledge, do you know anything about the practical operation of the Wells machine as distinguished from the Burr & Taylor machine?

A. I have seen bodies formed on both of the machines, but I am not acquainted with machinery enough to describe the particular difference in all respects.

X. 12. How long has it been since you saw a Wells machine, as distinguished from a Burr and Taylor machine, at the factory, in regular operation?

A. I have seen one of them in operation within the last two or three days.

X. 13. Was that a recently constructed machine in appearance?

A. I should judge it was, although I cannot speak confidently on that subject.

X. 14. Do you not know, and have you not heard, that that machine was constructed recently?

A. I have no knowledge on that subject whatever. Could not tell whether it was made within a month or ten year ago. Some portions of it appear to be new.

X. 15. What portions?

A. The guide on the end of the trunk—I don't know what the term is for it—that appeared to be new.

X. 16. How was this guide operated?

A. It was operated by the hand of one of the workmen.

X. 17. Who was operating it when you saw it?

A. Mr. Dodd, Mr. Burr's foreman.

X. 18. Who was present?

A. There were two or three belonging to the factory, to
234 assist him in the forming. Also, Mr. Avery Green was by during part of the time. No one else that I recollect of now.

X. 19. How did you come to see this machine?

A. Some one told me in the store that some one wanted to see me at the factory of Mr. Burr. I can't tell who left word?

X. 20. How came you to examine this machine?

A. I examined it at the request of Mr. Dodd, I think.

X. 21. What did Mr. Dodd say to you?

A. He asked me to see him form some bodies on that machine.

X. 22. How did you know it was a Wells machine as distinguished from Burr & Taylor.

A. A plan of the Wells machine was shown me, with the request that I would examine it, and see that it corresponded with the plan of the machine.

X. 23. When had you, if ever, seen a Wells machine, as distinguished from a Burr and Taylor machine, in operation before at the complainant's factory?

A. I am not aware that I ever saw one.

X. 24. Have you not stated in a former deposition that your knowledge about Burr's factory was derived from being frequently there, and almost invariably inquiring as to the number of machines running there?

A. I think I so stated in a former deposition.

X. 25. Is it true?

A. It is.

Direct resumed.

Q. 26. In your cross-examination you say that, when you saw hat-bodies formed by a machine at Mr. Burr's within two or three days, that there were two or three present to assist in the forming. Please state what they were severally doing.

A. One person was feeding the machine. Mr. Dodd was guiding the fur on to the cone, and another one stood ready to dip them in a tub of water and remove them from the cone.

SAMUEL G. STARR.

Subscribed and sworn to before me this 12th day of September, 1861.

R. E. STILWELL,
U. S. Commissioner.

235 UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this twelfth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Henry B. Renwick, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said Henry B. Renwick being about the age of forty-four years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Henry B. Renwick, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, occupation, and residence? and state briefly what have been your opportunities of becoming acquainted with machinery and improvements in the arts; and what situation, if any, you now hold, or have held, under the government of the United States.

A. Henry B. Renwick; age, forty-four; reside in the city of
236 New York. I have been engaged in the construction of machinery, and as consulting engineer, and have been frequently called upon to give opinions as to the operation of machinery, chiefly in reference to patent suits, in which I have been frequently called as expert. I was about four years and a half principal examiner in the United States Patent Office; am now, and have for the last eight years, or more, been United States inspector of steamers for the port of New York, and was, before going into the Patent Office, employed about six years by the government as engineer—part of the time in surveying, and part of the time in construction of various works.

Q. 2. Have you examined the letters patent issued to Henry A. Burr upon an alleged invention of Henry A. Wells, and are you acquainted with the contents thereof, which letters patent are dated the 4th of December, 1860, and designated "Reissue No. 1087?"

A. I have examined the patent, and I understand the contents of it.

Q. 3. State whether the description contained in that patent is sufficient to enable a person skilled in machinery to make the machine therein specified.

A. It is.

Q. 4. Look at the model now shown you, and marked "Exhibit E, H. A. Wells," and state whether it represents the machine described in that patent.

A. It does, except in the precise arrangement of the pulleys, and in the form of the outside of the top of the trunk, which is represented as flat in the drawings and rounder in the model. These changes are formal, and would not affect the operations of the machinery.

Q 5. What, in the specification, is described to be the form of the inside of the top of the trunk where you say it is represented as flat on the outside in the drawings?

A. It is described to be, at its delivery aperture, nearly of the form of the cone, but narrower and higher; the trunk would, therefore, at that place, be round topped on the inside, so as to correspond with the form of the cone shown in the drawings attached to the patent.

237 Q. 6. Explain what you understand to be described in that patent reissue 1087, as the invention of Henry A. Wells.

(Objected to.)

A. A machine for forming a fur hat body of required thickness in various parts; said machine consisting essentially of a rotary picker, a pervious cone, an exhausting-fan, and an apparatus for directing a current of fur in the proper manner upon the cone; the current of fur being shaped by this apparatus so as to adapt itself to the proper formation of the bat upon the cone. There are also described in the patent as of Wells's invention, to be used in connection with the rotating picker, an upper deflector, a lower deflector, and certain means for producing a current of air to aid in supporting and directing the current of fur, so that it may be properly deposited on the cone.

Q. 7. Look at the model now shown you, and which is marked Exhibit A, and state whether or not it includes, in whole or in part, what is described as the invention of Henry A. Wells, in said patent "Reissue No. 1087," and give your reasons for such conclusions as you shall express thereon.

(Objected to.)

A. I find in said model a rotating picking apparatus, which takes the fur from a nipping apparatus, and throws it by centrifugal force towards a pervious cone, substantially identical in all respects and operating in the same manner and for the same purpose as the rotating picker described in the Wells patent. In the model I find a rotating pervious cone and an exhausting-fan combined with it; said fan, when operated, drawing air through the interstices of the cone, and operating to draw fur fibres that have been impelled by the picker on to the surface of the cone, and hold them there, such being the operation of the cone and the fan in the Wells patent. I also find in the same model a contrivance for directing the current of air

thrown by the picker, and drawn by the exhaust-fan, in such manner that the current will be so shaped and directed as to be distributed upon a cone to form a bat of varying thickness. This apparatus lies between the picking mechanism and the cone, as in the Wells machine, and effects the same purpose. It consists of a flat sur-
238 face, like the bottom of the trunk in the Wells machine, having sides which project but a very short distance above the bottom of the mold-board, directly in front of the picker, and a hinged valve or lower deflector lying beneath the picker, there being an aperture for the exit of a current of air above the valve and below the *the* picker. The flat surface in the model performs the same office as the bottom of the trunk in the Wells machine, in so far as it prevents currents of air rising and interfering with the direction of the fur-bearing current. The hinged deflector in this machine performs the same office as the hinged lower deflector in the Wells machine, in regulating the elevation or descent of the current of fur thrown by the picker, and, like the lower deflector in the Wells machine, lies between the picker and the cone, and is adjustable. This deflector is also traversed on its upper side by a current of air, as it is in the Wells machine. This current of air entering through a small aperture as in the Wells machine, and proceeding, as in the Wells machine, from the picker towards the cone. This current of air, in the model, performs the same office as the current of air entering under the picker in the Wells machine. In the model, a part of the mold-board acts in connection with the hinged valve, to prevent the current of fur, which is being deposited, from dropping too low upon the cone, or falling upon the flat surface. And the mold board, as a whole, operates as the trunk does, in the Wells machine, to dispose the fibres of fur thrown by the picker into a form corresponding to some extent with the shape of a vertical section of the cone. This office being performed, in the Wells machine, by the picker throwing the fibres upward into a concavity or concave surface formed by the top and sides of the trunk, while, in the model, the picker throws the fur downward upon a convex surface; but both the concavity in the Wells machine and the convex surface in the model change the direction of the fur-bearing current thrown by the picker, and also change the shape or contour of the current, so as to throw it properly upon the cone. The final shape of the current in the model and in the machine being similar, and depending for their exact shape, in the one case, upon the shape and precise form of the concave surface,
239 and in the other upon the shape of the convex surface or mold-board. The current of air above the lower deflector is produced, in the model, by a blast from the fan that exhausts the pervious former; while in the Wells machine it is induced partly by the rotation of the picker, and partly by the fan which exhausts the cone. In the Wells machine there is an upper deflector or hood by means of which fur can be differently located on the same cone, at different times, or by means of which good bodies can be made on different-shaped cone without altering the shape of the trunk, so as to correspond with the shape of the cone which it might be desired to use. That machine, therefore, has the capacity for forming bats on differ-

ent-shaped cones without changing the shape of the trunk, so as to conform to the cone, as stated in the patent. I do not see on the model any apparatus to effect that purpose, and it would be necessary, I should think, to change the shape of the mold-board when one cone is substituted for another. I find in this model all the parts or elements specified as being of Wells's invention, in the patent, or their substantial equivalent, with the exception of the upper deflector of the Wells machine; said parts being combined in the same way as in the Wells machine, and operating in combination in substantially the same manner to produce the same effect.

Q. 8. In your last answer you say you think it would be necessary to change the shape of what you call the mold-board, in model "Exhibit A," when one cone is substituted for another. What do you mean by changing the shape?

A. I mean changing its form; making its apex higher or lower, and changing the form of the curve that unites the apex with the ends of the board; such change varying the precise shape of the fur-bearing current, but still disposing it so as to approach the cone in a form corresponding in some measure to a vertical section through the cone; I mean the precise cone on which the hat is to be formed.

Q. 9. Look at the model now shown you, and marked Exhibit B, and assume that the piece marked A B C be removed, and then state whether that model in that condition would contain anything, and if it does, then what, that is, specified as the invention of Henry
240 A. Wells, in said reissued patent No. 1087, and give your reasons for the conclusions which you shall express?

A. I can answer that question shortly, by saying that model Exhibit B, assuming the piece A B C to be removed, is substantially like, in all respects, model Exhibit A, with the following exceptions, namely: that the mold-board in Exhibit B is made in steps, while that in Exhibit A is curved. This I consider to be merely a formal change, as far as I can see; both boards would change the direction and shape of the fur-bearing current in substantially the same way. In Exhibit B the hinged valve or lower deflector, which is adjustable as in A, and occupies substantially the same position with reference to the other parts of the machine, would have a current of air below it as well as above it; but the current of air above the deflectors, in both A and B, would be substantially the same, and produce the same effect; and the current below the deflector, in B, would not produce any useful effect as far as I can see. In A the greater part of the current passing through the aperture beneath the picker is produced by a blast from the fan that exhausts the cone, while in Exhibit B this current is produced by an independent fan used for that purpose only, and the blast from the exhaust-fan is permitted to go to waste. But in both models there will be substantially the same current of air, producing the same effect; the mode of operation being the same, but the precise means of forming the current being different. In model B, the flat surface and the cone are dropped further below the pickers than in model A, which is a difference in degree, and amounts to no more than the adjustment of the trunk with reference to the cone in the Wells patent, and there are no low sides to the flat surface in

model B, as there are in A. These sides, I should think, did not exercise a very important office in model A, as the molding or shaping of the current of fur depends altogether upon the form of the convex surface of the mold-boards, as modified by the blast of air above the lower deflector, and the exhaust current entering the cones.

Q. 10. State whether or not machines made and operated substantially like models A and B, supposing the piece A B C on
241 model B to be removed, would employ and include substantially the invention described in said patent as that of H. A. Wells.

(Objected to.)

A. I think they would in all respects, with the exception of the use of the upper deflector in the Wells machine in connection with the rotating picker and exhausted cone.

Q. 11. Have you examined, and do you understand, the contents of the letters patent issued to Lansing E. Hopkins, dated the 1st day of December, 1852, and designated "No. 9484;" and if yea, state whether the description in said patent is sufficient to enable a machinist to make the machine therein specified.

A. I have examined the patent and understand its contents, and know that the description therein is sufficient to enable a machinist to make the machine described in the patent.

Q. 12. Look at the model now shown to you and marked Exhibit D, and state how it corresponds with what is described in the last-mentioned patent.

A. It corresponds in all respects, except that the steam-pipe and that the fans "H," at the side of the picker, which the patentee in substance says may be used, are not represented in the model.

Q. 13. State whether you find anything, and if yea, what, in model Exhibit A, which is described and specified in the last-mentioned patent as the invention of said Hopkins.

A. I do; I find in model A a chamber into which exhaust air for the cone is blown, so that it may pass out beneath the picker, such a chamber being described and specified in the Hopkins patent, and as supplied by air from the cone in the same way as the chamber is supplied in model A. and in both model A and in the Hopkins patent machine the current of air proceeding from the exhaust cone into the chamber and out under the picker produces the same effect. In model A I also find a hardening apparatus, consisting of a surface having motion upwards, and downwards, and sideways, such surface acting to harden the bat, and being mounted upon a hinged support or frame, so that the hardening apparatus may be approached towards and in contact with the bat on the cone to harden it, and may be
242 moved away from the cone after the hardening is done, so as to permit the removal of the bat or the cone and bat together. And in Hopkins's patent I find a hardening apparatus, consisting of rollers having a motion upwards and downwards, and also in direction of the cone's revolution; said rollers being mounted on a hinged frame so as to permit either of hardening or of the removal of a bat, or both bat and cone. In both the model and the patent the hardening apparatus have substantially the same motions, and are mounted in substantially the same way to produce the same effect. The concave

surface in model A has a motion contrary to the revolution of the cone in addition to the motions of the rollers in the Hopkins patent, and it acts on a larger surface of the bat than the rollers do, but the hardening apparatus in both machines has a motion upwards and downwards in the direction of the axis of the cone, and also a motion in the direction of the revolution of the cone. In Hopkins's patent the axis of the hinge is horizontal, while in model A it is vertical, but the hinged joint and the mounting of the apparatus thereon serves the same purpose in both machines.

Q. 14. State whether you find anything in model Exhibit B which is specified in the said Hopkins patent as the invention of Hopkins; and if you do, explain what it is.

A. I do; I find in Exhibit B a hardening apparatus and method of mounting the same exactly like that represented in Exhibit A. Exhibit B, therefore, containing a hardening apparatus having a motion upwards, and downwards, and sideways, mounted on a hinged frame so as to be used in connection with a perforated cone in a manner substantially as set forth in Hopkins's patent.

Q. 15. Have you examined and do you understand the contents of the letters patent issued to Henry A. Burr for an alleged invention of Alva B. Taylor, dated the 21st of August, 1860, and designated "Reissue No. 1030?"

A. I have examined it, and do understand its contents.

Q. 16. Look at the model now shown you and marked "Exhibit F," and state how it corresponds with the machine described in the last-mentioned patent.

A. It is a substantial representation of the machine described
243 in the patent, so far as the picking mechanism, the pervious cone, and the hardening apparatus, blower, and exhaust box.

Q. 17. State whether or not you find anything in Exhibit A and Exhibit B which are described and specified as the invention of Alva B. Taylor in the last-mentioned patent; and if you do, explain what it is.

(Objected to.)

A. I do; I find described in the Taylor patent a vibrating concave surface acting in connection with an exhausted cone on which a bat of fibres is held by the pressure of the air. This vibrating concave surface operating to harden the fibres held upon the cone by the air, so that the bat may be removed from the cone to undergo other processes. This concave surface operating to harden the bat by means of pressure and a jiggering motion imparted to the surface, and the jiggering surface acting over a greater extent of the surface of the bat than a roller does, and thus performing the hardening in less time. In both Exhibits, A and B, I find a concave surface operating in connection with an exhausted cone to harden a bat held upon a cone, such concave surface acting by pressure and a jiggering motion to effect the hardening in the same way as the surface does in the machine described in reissue No. 1030. The surface in the Exhibits A and B is a cloth surface, and in the machine of the reissue is described as a metallic surface, but the change of the material does not, as far as I can see, affect the operation of the surface in the operation of

hardening; and I know that the machine described in the reissue No. 1030, and machines having hardening apparatus like Exhibits A and B, act to harden the bat while held upon the cone by the pressure of the air by substantially the same mode of operation. On further examination of the patent, reissue No. 1030, I find that no special material is named for the construction of the concave surface.

Q. 18. State whether or not the means of hardening and of holding the bat on the cone while being hardened, which is specified in the last-mentioned patent as the invention of Taylor, is substantially employed in machines like Exhibit A and Exhibit B.

(Objected to.)

244 A. They are substantially the same.

Q. 19. If, in use of machines like Exhibits A and B, the coner or operator were to hold a piece of board or stiff paper between the picker and the cone to guide the fur to the desired place upon the cone, would such board or paper perform the function or office of any part of the Wells machine; and if yea, what part?

A. If the operator held this piece of board or paper above the current of fur as shaped by the mold-board, so as to elevate the fur towards the top of the cone, or if he held the board or paper in the upper part of the current of fur, so as to depress a portion of it towards the base of the cone, the board or paper would in both cases be an equivalent for, and perform precisely the same duty in the same way that the hood or upper deflector described in the Wells patent 1087 does. This patent describing the use of the hood by the hand of an operator, or by automatic machinery.

Q. 20. Are you acquainted with what is called the Burr and Taylor improvement for which they obtained an American patent, dated the 9th day of February, 1847, and numbered 4962?

A. I am; having examined a certified copy of the patent.

Q. 21. Please explain what relation that or those improvements sustain to the Wells machine; that is, to what parts of that machine do they apply, and *and* what alterations do they make in the original Wells machine?

(Objected to.)

A. One of the improvements applies to the feeding apparatus, described as making part of the Wells machine, by adding cloth-covered rollers between the feeding apron and the rotating picker. Another of the improvements is a movable valve applied to the aperture that admits air under the picker in the Wells machine. And a third improvement relates to the manner of constructing the trunk by the combination of flexible sides, with a movable top, which can be elevated or depressed so as to alter the hight of the delivery aperture of the trunk. This latter improvement constituting, in fact, an adjustable trunk, so that the same trunk can be used for different sizes

245 and shapes of cones. When the trunk of the Burr & Taylor machine is so adjusted as to suit any one cone, its mode of operation is the same as a Wells trunk made expressly for the same size and shaped cone, but the same Burr & Taylor trunk is capable of adjustment when the machine is not in operation, so as to suit different cones. The invention of Burr & Taylor, as I understand it, is

not in the mode of operation, but in the mechanical construction of the trunk.

Q. 22. In your last answer you have spoken of a Burr & Taylor machine and a Burr & Taylor trunk; what do you mean by those expressions?

A. I mean the machine and the trunk described in Taylor's and Burr's patent, No. 4962, dated February 9th, 1847.

Q 23. You say one of the improvements consisted of putting a valve in an aperture below the picker. What was the use of that valve?

(Objected to.)

A To regulate the intensity of the current of air passing through the trunk.

Q. 24. State whether or not the aperture in which the valve was placed was described in the Wells patent?

A. It was.

Q 25. State whether or not the introduction of the Burr & Taylor improvements into the Wells machine removed or took the place of any of the main and characterizing features of the Wells machine, as it is described in the patent reissue 1087?

(Objected to.)

A As far as I know, they did not. In the general use of the Burr & Taylor machine, the hood, as specially described in the Wells patent, is not used, such hood being a portion of the deflecting and directing apparatus; but the place of this hood is in a measure taken by the movable top of the Burr & Taylor trunk, which is adjusted upwards and downwards upon an axis when cones of different size are used.

Q. 26. Is not the hood a movable top-piece, and is it not adjusted up and down; and is it not adjusted up and down when cones of different sizes are used?

(Objected to.)

246 A. I answer yes to the three interrogatories in the question.

Q. 27. Have you seen a machine in operation for forming hat-bodies corresponding in construction and form with the Wells machine, described in the patent reissue No. 1087, including the hood, and without any of the Burr & Taylor improvements; and if yea, when and where, and how did it work?

A I have seen in operation a machine made in exact accordance, both as to form and proportion, with the drawings and description of reissue No. 1087, having a hood exactly like that represented in the drawing, and without any of the Burr & Taylor improvement. I saw the machine in operation several times during the last week at Mr. Burr's factory, in Frankfort street, and also during the present week. I am not a practical hatter nor a judge of the quality of bats, but as far as I could see, the bats or bodies made on the Wells machine were equally as good as those made on the Wells machine with the Burr & Taylor improvements added thereto.

Q. 28. Have you seen bodies formed by the Wells machine with the Burr & Taylor improvements; and if yea, does it require any more men to form the bodies by the Wells machine without the improvement than it does with the Wells machine with improvements?

(Objected to.)

A. I have repeatedly seen numbers of the Wells machine, with the Burr & Taylor improvement, in operation. Each of these machines requires three operators: one to feed, one to attend to the depositing of the fur, who is called a coner, and a third to remove and replace the cone and harden the bats for removal from the cone. In the use of the Wells machine, without the Burr & Taylor improvements, only three operators are required: a feeder, a coner, and a man to remove and replace the cones and harden the bat, who is called the dipper.

Cross-examined by Mr. Harding, counsel for defendants

X. 29. Is the invention specified in reissue 1087 a machine?

A. The invention specified is a combination of parts or mechanical elements making up a machine, or parts of a machine.

247 X. 30. Do you consider Exhibit E to represent the invention specified in reissue No. 1087?

A. I do.

X. 31. How many parts go to make up that machine? I mean operative parts, and not mere pulleys and gearing, frames, &c.

A. Well, the essential parts are, first, the rotating picker; second, the pervious cone; third, the apparatus for altering the direction and shape of the fur-bearing current, so as to insure proper deposition upon the cone. An apparatus of some kind for delivering the fur to the pickers is also necessary. The apparatus for altering the shape and direction of the fur-bearing current is made up of several parts, all of which may be used in the formation of a body; and these are the trunk, considered separately, the upper and lower deflector, which are in fact parts of the trunk, and the current of air entering below the picker. This current of air cannot be correctly called a part of the machine, but there is in the machine an aperture and proper mechanical appliances, namely, a fan and a picker, or a rotating brush for producing that current.

X. 32. Which of those parts can be removed from the machine without destroying its operation?

A. The hood, the lower deflector, and I think, to a great extent, if not entirely, the current below the picker, but I have never shut that off entirely in operating the machine.

X. 33. Can the trunk be removed from that machine, and its organization or operation preserved?

A. No; for in that case there would be no means of changing the shape and direction of the fur-bearing current, which is thrown towards and drawn on to the cone.

X. 34. Did you ever see a machine in which the hood was operated automically, as in model E?

A. No.

X. 35. You say that reissue 1087 describes as the invention of Henry A. Wells a machine for forming a fur hat-body of a "required thickness in various parts;" and you say again, "that the current of fur being shaped by this apparatus so as to adapt itself to the

proper formation of a bat upon the cone." What do you mean by the term, "required thickness in various parts," and "proper formation of a bat?"

248 A. I mean so to form a bat that it shall be thick where the crown and brim unite, and thin on the top of the crown, decreasing in thickness from the brim upward.

X. 36. In what way does the trunk in Exhibit E operate to change the direction of the fur, and cause the deposit of the fur in the required manner?

A. It operates by drawing the current together, and permitting the current to elevate itself by the change of form of the trunk from the one end to the other. The top and sides of the trunk embracing the current of fur.

X. 37. Is not this action on the fur caused by the sides and top of the trunk constraining the air which moves towards the cone by the action of the exhaust within the cone, as well as the current of air created by the picker?

A. The sides and top of the trunk do act to constrain these currents, and also act to constrain or alter the direction of the fur which is thrown off by the centrifugal action of the picker.

X. 38. You have spoken of a rotating picker as forming part of the Wells machine, represented and described in reissue 1087; does the word picker occur in the patent?

A. It does.

X. 39. Refer me to all of the passages where it occurs.

A. It occurs in the 136th folio, on the 38th page of the printed record; also in the 137th folio, on the same page; and again in the 138th folio, on the 39th page.

X. 40. Which part of Exhibit B do you consider to be the equivalent for the trunk in the Wells machine? My question proceeds upon the same hypothesis as to A B C as the examination in chief did.

A. The mold-board, consisting of a series of steps in front of the picker, which acts to constrain the fur fibres and the current of air proceeding from the picker, so as to change the shape and direction of the current of fur as it proceeds toward the cone.

X. 41. In reissue No. 1087 it is stated that "as the fibres are presented they are brushed and properly laid by the downward action of the brush, as indicated by the arrow, and when liberated," etc. Is there any brushing action in Exhibit A or B?

249 A. I should think that there was, as the wires on the rotating picker of the two exhibits brush or comb out the fibres as delivered to them by the feeding-belt.

X. 42. Do you find any chamber between the picker and the cone on the model Exhibit B?

A. I do not find anything that would ordinarily be called a chamber, although there is something which performs the same office as the chamber in the Wells machine.

X. 43. Were you consulted in the preparation of this specification No. 1087?

A. The specification was shown to me by Mr. Keller after it was

drawn, and my impression is that I prepared some amendments to it; whether they were adopted or not I do not remember.

X. 44. Do you regard the machine (Exhibit F) as containing the invention specified in reissue 1087?

A. I do not.

X. 45. Did you regard that machine (Exhibit F) as containing the invention specified in the prior reissue of the same patent, (reissue No. 396?)

A. I did

X. 46. What is the difference between the invention as specified in reissue No. 396, and the invention as specified in reissue No 1087?

A In reissue 396 the invention specified is a process of forming a hat-body by throwing fur in properly regulated quantities against a section of a rotating cone or other form, in connection with a method of holding the fibres after they are thrown upon the surface of such cone or other form, such combined process not being limited to being worked out by the use of a rotating picker or a deflecting and shaping apparatus, or by the use of a conical former In reissue 1087 the invention specified is various combinations of elements or parts of a machine, in all of which a rotating picking mechanism is one of the elements, and also the means for directing the fur-bearing current, either considered as a whole or the parts thereof, or accessions thereto, which are the upper and lower deflectors, and the means for inducing the current of air beneath the picker to aid in bearing up and directing the current of fur.

X. 47. Has not Exhibit F a rotating picker, a pervious former, an exhausting mechanism, and means for directing the fur-bearing current.

A. It has; but it has no means for changing the shape of the fur-bearing current after it has left the picker, so as to distribute it properly upon the cone, so as to make the desired form of bat.

X. 48. Specify what part of the machine of Exhibit E is wanting in Exhibit F.

A. The hood or upper deflector, the lower deflector, so much of the trunk as changes the shape of the fur-bearing current so as to effect the proper distribution upon the cone, and the means for inducing a current of air beneath the current of fur.

X. 49. Is there any trunk, or equivalent for any trunk, in that machine, (Exhibit F.)

A. There is an equivalent for so much of the end of the trunk nearest the picker as acts on the fur to give it direction at the instant of leaving the picker; but there is no trunk to adapt or shape the current of fur so that it may be properly distributed upon the cone.

X. 50. What is that equivalent?

A. The upper picker and the piece of copper behind it.

Adjourned to 10 a. m. the 13th inst.

FRIDAY, *Sept.* 13*th*, 1861.

Counsel on both sides present.

X. 51. Did you not, on your examination, on the application of Burr & Taylor for an extension of letters patent on the 23d day of

January, 1861, say, in answer to the following question: "Do you know of any practical hat-body forming machine, produced since the Wells invention, which does not infringe the Wells invention on which Burr & Taylor made their improvement?" reply, "I do not, as I understand the invention, and as it is described in the reissues now in force."

A. I did, I believe. The answer made by me, referring to both reissues now in force, one of which has not been referred to in my present examination.

X. 52. Referring to your 49th answer, am I to understand that the trunk which is interposed between the picker and the cone is
251 to be a peculiar trunk, in order to bring the machine within the Wells invention of reissue 1087?

A. Peculiar in so far that by its shape it shall both direct the current at the instant of leaving the picker, and shape or proportion the current so that it shall be distributed upon the cone to form a bat of the required thickness.

X. 53. Would a trunk of such a shape that it would be unable to so distribute the fur as to form a bat of the thickness heretofore defined by you as the required thickness, contain the invention as set forth in reissue 1087?

A. I think it would, if used in connection with a hood or its equivalent, as described by Wells.

X. 54. Suppose the trunk referred to in the previous question were used without the hood or its equivalent, would it then contain the invention set forth in reissue 1087?

A. The machine with such a trunk would be useless, and I do not think it would contain the invention specified in the first clause of 1087.

X. 55. My last question refers to the invention specified in reissue 1087, without reference to any particular clause or claim.

A. I can answer the question in no other way than I have before; for a machine might well contain certain things specified as the invention of Wells without containing other combinations which are also specified as his invention. When a question is put not referring to a particular clause of Wells's specification and claim, I consider it as referring to all the clauses.

X. 56. Do you regard the machine Exhibit F as containing the invention specified in reissue 1087?

A. As I before have stated, in answer to one of your questions, I do not.

X. 57. By this, am I to understand that it contains the invention specified in either of the clauses of the claim?

A. That is my opinion.

X. 58. Specify the invention which you understand to be included in each of the claims of reissue 1087, severally.

A. The first claim is to a combination of a rotating picker, a per-
252 vious former, an exhausting mechanism, and an apparatus for directing a fur-bearing current to form bats of fur fibres of the required varying thickness when they act together under a

mode of operation substantially the same as is worked out by the machine specially described in the patent. The second clause of the claim is to the combination of a rotating picker, a pervious former or cone and its exhausting mechanism, and a lower deflector, which latter is an apparatus which serves to regulate the deposit of fibres of fur, at and about the base of the conical former, acting to throw or deflect currents of air or fur toward the top of the cone. The third clause of the claim is to the combination of the first three elements named in the last claim, with an upper deflector or hood, which is a contrivance which may be used either to throw downward towards the base of the cone, or raise upward on to the top of a cone, fibres of fur impelled forward by a picker and drawn towards the cone by currents of air entering its perforation. The last clause of the claim is also to a combination of the first three elements in the second and third claim, with any proper means of inducing a current of air from a point substantially beneath a picker, and passing towards a perforated cone, such current operating to bear up and aid in directing fibres of fur impelled by the picker and drawn towards a cone by air entering through the orifices of the cone.

X. 59. Please point out on the machine Exhibit E the invention which constitutes or is embraced in those clauses of claims severally, using the mechanical terms to the specific parts adopted in the specification.

A. I have my finger now on the rotating picker, now upon the exhausting mechanism, and now upon the pervious cone or former, which are elements common to all the claims. I will point out now the upper deflector which is part of the combination specified in the third clause of the claim. I now point out the lower deflector, specified as one of the elements of the combination in the second clause of the claim, and I now point out the aperture underneath the picker, the picker itself, and the exhausting fan, which are in this machine the specific means for producing the current of air to aid in bearing up and directing the fibres of fur, and which, or their equivalent, are specified in the last clause of the claim as being of Wells's invention, when used in combination with the rotating picker, cone,

253 and exhausting mechanism, previously pointed out by me. I now place my hand on the trunk, my finger on the hood or upper deflector, also on the lower deflector, which, together with the current of air, constitute or make up the directing mechanism claimed in the first claim; but I do not wish to be understood as giving it as my opinion that all these parts separately must of necessity be used in a machine which would infringe that claim, for it is evident to me that the hood, if it be used without motion, amounts to no more than a peculiar shaping of the mouth-piece of the trunk so as to fit it to some special form of cone, and that the lower deflector, it pinned fast, (and it is often so used,) is the only boundary of the bottom of the trunk at its delivery, with an inclination upward adapted to the distributing of the fur upon any particular cone. I therefore think that the use of sufficient of these various directing means to properly distribute the fur, such as a trunk or its equivalent of a proper shape without a hood or lower deflector, would be a use of the directing me-

chanism specified as one of the elements of the combination in the first claim of reissue 1087.

X. 60. Is Exhibit F a correct representation of defendants' machine in the case of Burr *vs.* Cowperthwaite?

A. I am not prepared to speak with certainty on that point. I cannot recollect exactly what the machines used by the defendants were. The Cowperthwaite machine that I saw in use had, as far as I remember now, (and it is some time since,) a short trunk made of thin board or pasteboard that was used by a paper hood operated by hand.

X. 61. Was the machine like the Wells machine, which you saw within the last two weeks at Burr's factory, the first Wells machine as distinguished from the Burr and Taylor machine that you ever saw in operation?

A. I think it was, but I am not perfectly certain.

X. 62. Was not that machine put up within the last two or three weeks? Do you not believe that the Wells machine, as distinguished from the Burr and Taylor machine which you saw lately run, was put together very lately?

A. I do not know when the machine was put up; all I do know is this: that the frame of the machine, feeding-belt, and
254 pickers looked very old, and that when I saw them standing at Mr. Burr's, I directed a new trunk, hood, and lower deflector to be made and applied to them, and of exactly the form and proportion shown and described in reissue 1087. When I first saw this machine, there was applied to it a trunk made of zinc, of a shape, as near as I can judge by eye, exactly like the trunk of model Exhibit E. My impression and belief is, that that trunk also was not an old one, but I have no positive knowledge on the subject.

X. 63 Had the machine a revolving brush like Exhibit E?

A. It had.

X. 64. Had that machine a lower deflector, constructed and arranged like Exhibit E?

A. It had.

X. 65. Did the lower deflector operate the same way as in this model?

A. It had a hinge and a lever under it, and could be operated in the same way as in the model.

X. 66. Referring to model Exhibit D, where do you get your authority for putting the valve and opening for the exhaust-box?

A. I did not put the valve there. The model, I have been informed, is an old one, and I do not see shown on the drawing any valve or opening for the exhaust-box. The statement in the patent is, that the exhaust-fan is a well-known device for exhausting the air from the cone, etc., and that the air passing into the cone is driven into the air-chamber. I have never seen an exhaust-fan applied to a hat-body machine without some passage leading from the fan to permit the air to escape.

X. 67. Does not the specification state that the air from the exhaust-box is "drawn forward into the air-chamber," which air-chamber is shown to be at the rear of the picker?

A. No; it does not. It says that the air entering the cone on

which the body is formed, is driven forward into the air-chamber, which the drawing shows to be located on a lower level than the picker, and on the opposite side of the picker from the cone.

X. 68. Does not the specification also call for auxiliary fans
255 on the picker to aid this current from the picker, as an optional auxiliary device, and would not this indicate that the air from the exhaust was thought of itself to be insufficient?

A. The specification does say that such an auxiliary device may be used, as I stated in my direct examination; but this does not indicate to me that the whole of the air from the exhaust was thought to be insufficient, but, on the contrary, that a large part of the air from the exhaust-fan was passing to waste, as is usual in hat-machines, and that the extra fans might be necessary to induce a part of that air to enter into the air-chamber below, and behind the picker.

X. 69. You say you are informed this is an old model. Were you informed that it had been altered?

A. No; I was not; but I know that the jiggering apparatus has been put upon it since I first saw it, and put upon it under my direction. When I first saw it, it had no hardening apparatus on it at all, and I am not aware that it has been altered in any way except to add that apparatus to it.

X. 70. Did you make any experiments before directing this addition to be made?

A. I had made a full-sized jiggering apparatus with two rollers only, and with it hardened bats. There was no alteration made in this apparatus after it was first made, except to ease the rollers so that they would turn freely, they being stiff at first, and smooth off the corner, that I know of. With that apparatus we hardened bats, and if that is considered in the light of an experiment, I experimented before directing the making of the jiggering apparatus on Exhibit E. I should also state that we used the large jiggering apparatus both with and without the steam-pipe and steam, the use of which is made optional in the patent.

X. 71. Were the rollers fast to the axle when you began the experiments?

A. No; they were not.

X. 72. Where did you ease them?

A. We eased them in the center or down through the hole in the center. When first put on to the machine they turned upon their
256 axis by the friction of the bat, and were made purposely so to turn; but, on turning on the steam, one of them at times stuck, and did not run freely; they were therefore eased, so as to turn as the cone revolved, as directed in the patent.

X. 73. Is the model a correct representation of the machine to which you refer, so far as the jiggering apparatus is concerned?

A. It is substantially a correct representation. As I stated before, we used only two long rollers in the machine, the number of rollers being optional in the patent; and in making the model, I directed three to be made, so as to correspond exactly with the drawing. I also had the shape of the supporting piece, in the model, made of the

form represented in the drawing. In the machine, the supporting piece was either one or two straight iron rods.

X. 74. Where do you get authority for the sleeve in the drawing?

A. What do you mean by the sleeve?

X. 75. I mean the way in which you have constructed the rollers upon the axis.

A. In the patent, they are called rollers, and the direction is, that they are to have an end-chase and turn as the cone revolves by pressing against the surface. A roller usually means a piece with a circular cross section with a hole through its center, so that it can turn on a pin, like the roller in an ordinary furniture castor. The rollers were therefore made on the direction of the patent, but they would act in precisely the same manner if they were fastened to their axle, and their axle permitted to revolve freely on their journal. The drawings do not indicate whether the rollers are to turn on their axle or with their axle.

Direct resumed.

Q. 76. Is your answer to the 60th cross-interrogatory given with reference to the defendants' machine in a suit by Burr and Cowperthwaite, in Connecticut, or by Burr against Taylor and Jessup, in New Jersey?

A. In that answer I said that I was not prepared to speak with certainty, or say what the machine used by the defend-
257 ants in a case by Burr against Cowerthwaite were. The machines I refer to in the same answer as having seen, were seen by me in Newark, New Jersey.

HENRY B. RENWICK.

Subscribed and sworn to before me this 13th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

259 No. 4962.

The United States of America to all to whom these letters patent shall come:

Whereas A. B. Taylor and H. A. Burr, New York, have alleged that they have invented a new and useful improvement in machinery for making hat-bodies, which they state has not been known or used before their application; have made oath that they are citizens of the United States; that they verily believe that they are the original and first inventors or discoverers of the said improvement, and that the same hath not, to the best of their knowledge and belief, been previously known or used; have paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose—

These are therefore to grant, according to law, to the said A. B. Taylor and H. A. Burr, their heirs, administrators, or assigns, for the

term of fourteen years from the ninth day of February, one thousand eight hundred and forty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Taylor and Burr, in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand at the city of Washington, this ninth [L. S] day of February, in the year of our Lord one thousand eight hundred and forty-seven, and of the independence of the United States of America the seventy-first.

JAMES BUCHANAN,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.

EDMUND BURKE,
Commissioner of Patents.

260 THE SCHEDULE REFERRED TO IN THESE LETTERS PATENT AND MAKING PART OF THE SAME.

To all to whom these presents shall come:

Be it known that we, Alva B. Taylor and H. A. Burr, of the city, county, and State of New York, have invented certain new and useful improvements in the machine for making or setting up hat-bodies, and that the following is a full, clear, and exact description of the principle or character which distinguishes it from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which figure 1 is a longitudinal vertical elevation; figure 2, a cross vertical section taken at the line (XX) of figure 1, looking in the direction of the arrow; figure 3, a plan of the machine, with the perforated former removed; and figure 4, a longitudinal vertical section taken at the line (ZZ) of figure 3. The same letters indicate like parts in all the figures.

Our invention is for improvements on the method of forming hat-bodies by throwing the fur or other fibres on to an exhausted perforated cone placed in front of a trunk or tunnel which receives the fur from the rotating brush or picker, and guides the delivery of it on to the perforated cone. Our first improvement consists in making the sides of this trunk of thin sheet metal or other substance which can be readily and easily bent to the desired form, so that the aperture or mouth of the trunk, which directs the deposit of the fur, etc., on to the perforated cone or former, can be changed at pleasure to increase or decrease the deposit of fur on any part of the former, as it may be desired to increase or reduce the thickness of any part of the hat. This object, which is of great importance in the manufacture of hats, has been attempted by providing the mouth of the trunk with a jointed hood which can be depressed or elevated; but it is found in

practice that this does not regulate this distribution so effectually as our improved method ; for any desired curve can be given to the sides to give a gradual enlargement or contraction to any part.

Our second improvement consists in making the top of the trunk so as that the end towards the former can be depressed or ele-
261 vated at pleasure, the back end being the axis of this motion, by means of which the mouth of the trunk can be adapted to any size of former and yet have the top of the trunk present an unbroken plane to avoid catching and retaining the fibres or the forming of eddies in the current of air that passes through the trunk, tending to interrupt the direct passage of the fibres from the brush to the former ; the top being so formed as to embrace the pliable sides, that the upper part of trunk may always be of the same size irrespective of the position of the top.

Our third improvement consists in providing the aperture at the back of the trunk, and below the feed-rollers and brush, with a valve or shutter, for the purpose of closing this aperture to prevent the passage of a strong current of air through the trunk at the commencement of each operation, and until the perforated former is covered with a film of fibres, by means of which the forming of welts or air-bubbles in the bat is effectually prevented. At the commencement of the operation, and before the perforations in the former are partly closed by the deposit of fibres, it will be obvious that the exhausting fan in the former will produce a much stronger current of air through the trunk than when the perforations are partly closed, and that therefore the fibres will be thrown on to the former at the commencement of the operation. This, it is found by experience, produces counter-currents which throw up the first film of fibres from the surface of the former, and thus forms welts or protuberances which are very injurious to the bat. But by closing the aperture at the back of the trunk the fibres are at first deposited by a gentle current and pressure, and after a film completely surrounds the former the opening of the valve or shutter admits the current, that the fibres may be thrown on with more force to complete the bat.

And our fourth improvement consists in the employment of one, two, or more rollers, covered with cloth or like substance, below the feed-rollers, the rotation of which, in connection with the brush, has the effect to brush, comb, or otherwise straighten the fibres before they are thrown by the brush and carried to the former.

In the accompanying drawings (*a*) represents a frame of the usual or any desired construction, and (*b*) an exhausting fan with a
262 chamber (*c*,) over which is placed the perforated former of any desired form, and in front of the aperture (*d*) of the trunk (*e*) which runs back to and is connected with the case (*f*) that surrounds the upper part of the rotating brush (*g*.) The bottom (*h*) of this trunk is flat, and gradually narrowed from the brush to the mouth, and to the edges of this are properly secured the sides (*ii*) of the trunk which are made of sheet copper sufficiently thin to admit of bending with facility, so that the mouth (*d*) of the trunk can receive any desired shape, and can at any time be changed to regulate the deposit of the fibres on to the former, for if the sides be bent so as to give the

form represented by dotted lines in figure 2, it will be obvious that the lower part of the bat will receive a greater quantity of fibres, in proportion to the middle, than if formed as represented by the full lines; so that by this means the attendant can alter the shape of the mouth to increase or decrease, to any extent desired, the deposit of the fibres on to any part of the former, and thus increase or decrease the strength of any desired part of the hat. The curve given to the sides at the mouth should be gradually run along the sides until the curves are lost to prevent any sudden curve along the sides. The top (*k*) of this trunk is, like the bottom, flat, and fits within the sides; the back end rests on the top of the case (*f*) of the fan, and the forward end, which is wedge-formed, extends a little beyond the sides, and to the end thus projecting are attached bars (*ll*) which pass along on the outside of the sides (*ii*,) and are connected again with the top at the back end, so that the sides being thus embraced between the top and these bars, when the forward end of the top is depressed or elevated the flexible or pliable sides follow, so that the upper part of the mouth of the trunk will always present the same size. The top is held at any desired elevation by means of a cord (*m*) attached to any part of the frame, or it may be held in any other desired manner. By means of this the height, size, and form of the mouth can readily be adapted to any size or form of former, or to the deposit of the fibres on any part thereof.

The back part of the trunk, between the bottom and the lowest of the rollers back of the brush, is open for the admission of a current of air towards the exhausted former, induced by the exhaustion
263 and the rotation of the brush. This aperture is provided with a valve or shutter (*n*,) by which it can be closed or opened at pleasure, to shut off, in whole or in part, the current of air. The axle of this valve is provided with an arm (*o*) and cord (*p*,) by which the attendant can hold it in any desired position, and thus regulate the force with which the fibres will be carried to the former.

The fibres are fed to the brush from an apron (*q*) by means of two feed rollers (*r r*) covered with cloth, and below these and in the curve of the brush are two other similar rollers (*s s*,) also covered with cloth, against which the fibres are brushed by the rotation of the brush, the surface of these rollers forming a curved bed against which the brush acts, whilst at the same time they continue to hold the fibres for the brush to act on them after they have been liberated by the feed-rollers. One of the feed-rollers receives motion by a belt in the usual manner and carries the others by means of toothed pinions (*t t t t*) on the end of each, that mash into one another.

It is not deemed necessary to describe the manner of carrying the brush, the former, and the exhausting fan, as there is nothing essentially new in these. It will be obvious from the foregoing that other substances may be substituted for copper in making the sides of the trunk, and that any substance which will bend with facility and retain the form given to it, will answer the purpose; but from the experiments that have been made, copper has been found to answer the best purpose.

What we claim as our invention and desire to secure by letters

patent is, first, making the sides of the trunk of thin sheet metal or other substance which will bend with facility and retain the form given in combination with the movable top, for the purpose of adapting the form of the mouth or delivery aperture of the trunk to any size or form of former, and to the regulation of the deposit of the fibres on the former to determine the thickness of the bat, substantially as herein described.

Second, we claim so connecting the top of the trunk with the sides thereof that it can be elevated or depressed at pleasure to increase or decrease the height of the mouth or delivery aperture of the trunk, and adaptit to any size of former that may be used, substantially as herein described.

Third, we claim the valve or shutter in combination with the
264 trunk, substantially as described, for the purpose of regulating or stopping the current of air through the trunk as described.

And fourth, we claim the addition of the roller or rollers, covered with cloth or other analogous substance producing like results, in combination with the feed-rollers and rotating brush, substantially as described.

A. B. TAYLOR.
H. A. BURR.

Witnesses:

A. M. GUSTIN.
CHARLES M. KELLER.

265 *Stipulation.*

U. S. circuit court, district of New Jersey—in equity.

HENRY A. BURR
vs.
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE. } On the Hopkins patent.

It is hereby admitted on the part of the defendants in this suit, that the copy of assignment by Lansing E. Hopkins to James Prentice and John Prentice and the copy of assignment by James Prentice and John Prentice to Henry A. Burr, on pages 94 and 95 of the printed record in this suit, are correct copies of the originals, and that such assignments were duly made, and that said copies may be read and used in evidence in this suit, with the same effect as the originals might be if duly proved therein.

COURTLANDT PARKER,
Sol. for Def'ts,
By GEO. HARDING,
Of Counsel for Def'ts.

266 *Stipulation.*

U. S. circuit court, district of New Jersey—in equity.

HENRY A. BURR
vs.
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE. } On the Wells patent.

And it is hereby admitted that an agreement was made in writing between St. John, Burr, Taylor, and Reynolds, of one part, and Duryee, Pinneo, Rankin, and Jaques, of the other part, on the 7th day of November, 1848, and that a correct copy of the same is printed in the printed record in the above-entitled suit, commencing on page 9 and ending on page 12; and that a further agreement was made in writing, on the 10th day of December, 1859, between Henry A. Burr of the one part, and Duryee, Jaques, and Duryee, of the other part, and that a correct copy thereof is printed in said record, commencing on page 12 and ending on page 14; and that said printed copies may be read and used in evidence in said suit, with the same effect as said original agreements could be read and used in evidence if duly proved therein.

COURTLANDT PARKER,
Sol. for Def'ts,
By GEO. HARDING,
Of Counsel for Def'ts.

267 Israel D. Condit being recalled this 13th day of September, 1861, says:

Q. 1. How many fur hat-bodies did you make on the Blanchard machine?

A. I can't tell exactly, but I made many thousands.

Q. 2. Was Henry A. Wells interested in the Blanchard machine?

A. He had an interest in it before I was connected with it.

Q. 3. When did he go to Europe?

A. I should think in 1837, but am not positive. It was about that time.

Q. 4. When did he return, as near as you can recollect?

A. It would be mere guess-work with me. Perhaps in 1843 or in 1844.

ISRAEL D. CONDIT.

Subscribed and sworn to before me, this 13th September, 1861.
R. E. STILWELL,
U. S. Commissioner.

UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this thirteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E.

Stilwell, a commissioner, duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled, "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789,

did call and cause to be and personally appear before me, at
268 my office, United States Court Buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Berzil Hagaman, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy, now depending and undetermined, in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, are defendants in each of said suits.

And the said Berzil Hagaman, being about the age of fifty-four years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Berzil Hagaman, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Berzil Hagaman; fifty-four years of age; reside at Milburn, New Jersey; and am engaged in hat-body making, and have always followed it.

Q. 2. Do you make hat-bodies by machines?

A. Yes, sir; I do.

Q. 3. Have you at any time been to England and put up a hat-body machine or machines; and if yea, when, and for whom, and what kind of machines?

A I have; I went from here 23d November, 1859, and came back in the fall of 1860; I put them up for Christy & Co., at Stockport, in England. They were the machines such as are used here at present by Mr. Burr. I put up two.

Q. 4. Did you put them in operation?

A. Yes; I did.

Q. 5. How did the Christys like them?

(Objected to.)

A. They told me they liked them first rate.

Q. 6. Did you travel about England while there?

(Objected to.)

A. I did, some three or four weeks.

Q. 7. Did you find any other kind of hat-body machine in England?

(Objected to.)

269 A. No, sir; I did not.

Q. 8. How did the manufacturing of the Christys compare with others in extent?

266 *Stipulation.*

U. S. circuit court, district of New Jersey—in equity.

HENRY A. BURR
vs.
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE. } On the Wells patent.

And it is hereby admitted that an agreement was made in writing between St. John, Burr, Taylor, and Reynolds, of one part, and Duryee, Pinneo, Rankin, and Jaques, of the other part, on the 7th day of November, 1848, and that a correct copy of the same is printed in the printed record in the above-entitled suit, commencing on page 9 and ending on page 12; and that a further agreement was made in writing, on the 10th day of December, 1859, between Henry A. Burr of the one part, and Duryee, Jaques, and Duryee, of the other part, and that a correct copy thereof is printed in said record, commencing on page 12 and ending on page 14; and that said printed copies may be read and used in evidence in said suit, with the same effect as said original agreements could be read and used in evidence if duly proved therein.

COURTLANDT PARKER,
Sol. for Def'ts,
By GEO. HARDING,
Of Counsel for Def'ts.

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ISRAEL D. CONDIT.

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R. E. STILWELL,
U. S. Commissioner.

UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this thirteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E.

Stilwell, a commissioner, duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled, "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789,

did call and cause to be and personally appear before me, at
268 my office, United States Court Buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Berzil Hagaman, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy, now depending and undetermined, in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, are defendants in each of said suits.

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A. Yes, sir; I do.

Q. 3. Have you at any time been to England and put up a hat-body machine or machines; and if yea, when, and for whom, and what kind of machines?

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(Objected to.)

A. They told me they liked them first rate.

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(Objected to.)

A. I did, some three or four weeks.

Q. 7. Did you find any other kind of hat-body machine in England?

(Objected to.)

269 A. No, sir; I did not.

Q. 8. How did the manufacturing of the Christys compare with others in extent?

(Objected to.)

A. The largest I saw or knew of.

Cross-examined by Mr. Harding, counsel for defendants.

X. 9. Was this machine exactly like the machine which Burr now runs?

A. They were two which Mr. Burr built in his shop; they are not exactly like those Mr. Burr runs—they have cards in them; I saw one in Mr. Burr's shop; I don't know whether he is running it or not now; they told me they had run it.

X. 10. At whose suggestion were the cards put in?

A. That I can't tell; they are in.

X. 11. How did the cards work?

A. They worked very well.

X. 12. Had you any trouble in getting the fur off the cards?

A. No.

X. 13. What took it off the cards?

A. The revolving brush.

X. 14. Did the brush then throw it into the trunk?

A. Yes; it threw it off the card into the trunk.

X. 15. Was the fur carded while on the card?

(Objected to for obscurity.)

A. I don't understand the question.

X. 16. What did the card do?

A. The card takes it from the feed-roller to the brush.

X. 17. Was there a carding point?

(Objected to for obscurity.)

A. There was a point on the cards.

X. 18. Did you examine these carding cylinders?

A. They were not carding cylinders.

X. 19. Did you examine them?

A. There was not carding cylinders there to examine.

X. 20. What kind of cards were they?

A. There was one cylinder and three flats.

X. 21. Describe the operation of it.

A. The cylinder took the fur from the feed-rollers; carried it past these flats to the brush.

270 X. 22. How were the flats made?

A. They were made out of wood, and cards nailed on them.

X. 23. Did you ever see Mr. Condit's machines?

A. I have seen them outside; I never saw the inside of them.

X. 24. Have they cards?

A. I can't be positive, for I never see any of them.

X. 25. Did you hear, or do you know, whether Burr's machines had been introduced or attempted to be introduced into England?

A. I saw one there when I went; I found it there when I reached England, and heard there was one running there, on permission of Mr. Burr. Wilson, I think his name was.

X. 26. Where was the one which you saw?

A. At Mr. Christy's factory.

X. 27. Was it running?
A. No; it was not running.
X. 28. Had it cards?
A. No; it had not.
X. 29. Why was it not run?
A. I ain't able to answer that question.
X. 30. How was the brush set with reference to the card-teeth on the machines which you introduced?
A. They were set in the position it would be set to the feed-rollers if it were set to the feed-rollers instead of the cards.
X. 31. Did the bristle run in contact with the card-teeth?
A. They run very close to it, but not so as to hit them.
X. 32. Were the bristles stiff, like those in Exhibit E?
A. Very similar.
X. 33. Were they arranged in ridges or rows, as in the model?
A. They were.
X. 34. Did Mr. Christy express his satisfaction at the way the card worked?
A. I don't know that Mr. Christy knew whether there was cards in or not. He expressed his satisfaction in the way the machine worked.
X. 35. What was the length of the bristle from the body of the cylinder?
271 A. I never measured it. I should think from $\frac{5}{8}$ to $\frac{3}{4}$ of an inch.
X. 36. If the end of the bristle did not strike the card-teeth, how did the brush remove the fur from the card-teeth on the card-cylinder?
A. The fur on the card lies very loose. It is like a feed-roller. It is not necessary for the bristles to strike the feed-roller to take the fur from them. It operates the same as a feed-roller.
X. 37. Does not the brush, as it revolves, generate a current of air, which forces the fur from the card-teeth and throws it into the trunk?
A. Yes; it must do that.

Direct resumed.

Q. 38. Did the machine which you found when you went to England appear to be a good one?
A. It was not a good one when I saw it; no doubt it had been.
Q. 39. What appeared to be the matter with it when you saw it?
A. The feed-rollers were out of order, and it was broken in some part. I don't recollect what part.
Q. 40. Do you know who took it out to England, or who left it there?
A. I was told that Mr. Dodd took it there.
(Objected to.)

Cross resumed.

X. 41. Did the Christys ask you to put the machine in order?
A. I think they did.
X. 42. Did you put it in order?

A. No; I didn't put it in order; they concluded not to have it started.

X. 43. Did you hear whether it had been used much?

A. I heard it hadn't been used at all—not practically.

X. 44. Did you hear how long it had been there?

A. I might have heard, but don't remember.

272 *Direct resumed.*

Q. 45. Why did the Christys conclude not to have that machine put in order?

A. I can't tell.

BERZIL HAGAMAN.

Subscribed and sworn to before me this 13th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this thirteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner, duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States Court Buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Isaac M. Holly, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy, now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits.

273 And the said Isaac M. Holly, being about the age of 37 years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Isaac M. Holly, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name age, residence, and occupation?

A. Isaac M. Holly; thirty-seven years of age; reside in Brooklyn; and am a hatter.

Q. 2. Do you carry on the business of manufacturing hats, or any part, and what part of hats?

A. Silk hat-bodies I manufacture.
Q. 3. Of what material are those bodies for silk hats made?
A. Of Russia or hare's fur.
Q. 4. Who forms your fur hat-bodies?
A. Mr. Burr.
Q. 5. How long have you been engaged in that business?
A. About thirteen years.
Q. 6. How much less do you think the hat-bodies which you make costs you than they would if they were bowed by hand?
(Objected to.)
A. At a rough calculation, I should think about 15 per cent.

Cross-examined by Mr. Harding, counsel for defendants.

X. 7. What do the hat-bodies cost you, on an average, formed at Mr. Burr's?
A. From six to nine dollars per hundred.
X. 8. What does the body cost, including material and your own labor on it, when it is ready to sell?
A. From twenty-five to fifty dollars per hundred, already blocked ready to put the silk plush on.
X. 9. What is the cost of such hats after finished, ready for market?
A. From twenty-four to forty-six dollars per dozen—about that; it may vary a dollar or two a dozen.
X. 10. Suppose 15 per cent. be saved in the cost of the bats, and that the cost of the entire hat, when ready for the market,
274 is from two to three dollars, would that make the entire saving in the cost of the hat about two per cent. due to the machine?
A. I couldn't answer that; it is out of my line.

ISAAC M. HOLLY.

Subscribed and sworn to before me this 13th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this thirteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner, duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending on the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed

September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States Court Buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, William Byfield, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said William Byfield, being about the age thirty-eight years, and having been by me first
275 cautioned and sworn to testify the truth, the whole truth, and nothing but the truth in the matter of controversy, aforesaid, I did carefully examine the said William Byfield, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. William Byfield; thirty-eight years of age; reside at Danbury, Connecticut; and am a hatter by trade.

Q. 2. Did you ever work on a Wells machine in forming hat-bodies, and if yea, when, for whom, and where?

A. I have; from about May, 1845, until the latter part of February or beginning of March, 1846. I worked for St. John and Burr, in Hague street, New York city.

Q. 3. How many machines had they there in operation? and state as near as you can the time when each of them was put in operation.

A. When I began to work for them, I helped take off for them, as I was informed, the first body that was formed on the first machine. They were then making the frame for a second one at that time, which, I think, was ready for forming hats in three or four weeks. A third one was put in operation, I think, in the month of August, 1845, and two more some time in the fall of the same year. I cannot fix the exact time in my mind.

Q. 4. Did any of them, and if yea, which of them, have a hood attached to the trunk, over the delivery end of the trunk?

A. Yes; the first three.

Q. 5. How did those three do their work?

A. In my judgment, they worked well; the machines themselves.

Q. 6. Did you form hat-bodies by the use of them?

A. I did, I believe, on all of them.

Q. 7. Have you since used hat-body machines without the hood, and such as Mr. Burr and his licensees now use?

A. I have.

Q. 8. State whether you made as good hat-bodies on the first three machines you have mentioned, using the hood, as you have since made on machines like those now in use by Mr. Burr and his licensees. (Objected to.)

A. I think I have.

276 Q. 9. Was there a hood to either of the last two machines which you say were put up by St. John and Burr, in Hague street?

A. I think not; but the operator used a piece of paper held in the hand in the place of the hood.

Q. 10. What did the operator do with the piece of paper?

A. He gave direction to the fur as it was thrown on to the cone.

Q. 11. What did he give direction to the fur for?

A. To make the bodies lay right.

Q. 12. Explain what you mean by laying right.

A. A hat-body requires to be made of varied thickness, which could not be done at that time, as we used the machine then without the hood or piece of paper I have described.

Q. 13. State whether these machines at St. John and Burr's had the delivery end of the trunks of the shape of a vertical section of the cones used in them.

A. The first three were not; the last two were more nearly so.

Q. 14. Which required the most attention, to direct the fur by a hood or a piece of paper; the first three or the last two of those machines?

A. The first three.

Q. 15. What effect did the introduction of the Wells machine produce in the manufacture of hats?

A. It made a complete revolution in the trade.

Q. 16. Which used to be regarded as the most important branch of a hatter's trade—what part of the work of making the hat?

A. Which do you mean, the making or the finishing? they are all combined in the hatter's trade.

Q. 17. I mean the making.

A. The bowing or preparing the body for felting or sizing.

Q. 18. Do apprentices now at the hat business learn to bow hats by hand?

A. They may in some places, but not that I am aware of.

Q. 19. At what place have you last worked at hatting?

A. Danbury, Connecticut.

277 Q. 20. How is that place, as to the extent of hat manufacturing, compared with other places?

(Objected to.)

A. One of our citizens, a short time ago, compiled a history of the hatting of Danbury, (Mr. Harding objects to hearing testimony,) in which he stated that hats to the value of two millions of dollars were made there annually. I cannot say as to other places.

Q. 21. About what is the population of Danbury?

(Objected to.)

A. I believe, something over seven thousand.

Q. Do you know of any apprentices in Danbury who are learning to bow hats as a part of their trade?

(Objected to.)

A. I do not; nor do I know of any having learned that branch of the business for the last five years.

Cross-examined by Mr. Harding, defendants' counsel.

X. 23. Were you examined as a witness in the suit of Burr *vs.* Cowperthwait about four years since?

A. I believe I was.

X. 24. Did you not say that, in working on the Wells machine, at the time you worked for him, the fur was usually deposited on about one-third the length of the cone, at the commencement of the operation, at the bottom or brim?

A. I may have done; I do not recollect.

X. 25. Did you ever work for Mr. Wells? and if so, describe how you formed a bat while you worked for him.

A. I worked for him in this way: Mr. St. John and Burr were the firm, and Mr. Wells had control of the workmen in the factory. On the first three machines which I described, the body was formed by guiding the fur with a hood placed at the mouth-piece or delivery of the trunk, and operated on by the hand of the operator to give direction to the fur, so as to form the body of the required thickness in its different parts. On the other two machines a piece of paper was used for the same purpose, in the hands of an operator.

X. 26. Were these two last machines the ones on which the mouths of the trunk were altered to suit the section of the cone?

278 A. They were.

X. 27. What effect did the little shutter under the picker have on the operation of the machine?

(Objected to, upon the ground that it don't appear that there was any shutter in those machines under the picker.)

A. I do not know what you mean.

X. 28. Did you never use a little valve under the picker to regulate the admission of air into the trunk?

A. Not on the first three machines that were built. On the other two, I am not sure Since 1851 I have used them.

X. 29. What is the effect of it?

A. It regulates the current of air.

X. 30. What effect has it on the bat?

A. If there is too much air introduced, it will cause the fur to roll in ridges. If not enough, it will cause the fur to drop too much upon the lower edge of the cone.

X. 31. Then the effect of this valve was to regulate the raising of the fur towards the tip of the cone?

A. I suppose it was.

X. 32. How did the deflector, at the lower part of the mouth of the trunk, operate on the Wells machine?

A. I can't tell you; not being an expert, I do not understand the use of the terms you have used.

X. 34. Examine the delivery end of the trunk of model E, and state whether there was any such device on the Wells machine as the lower flap; and if so, how it worked.

A. I believe there was, and it worked upon a hinge.

X. 35. Did the operator work it during the process of forming the bat?

A. I believe he did, when necessary.

X. 36. Do you know that he did?

A. To the best of my recollection, I think he did; I think I have.

X. 37. When did you work it; how did you work it; and what was its effect?

A. When I worked on those machines; I think usually by placing a block of wood under it; I think its effect was to keep the fur from falling too much on the edge of the hat-body, or on the edge of the cone.

279 X. 38. Did you move it up and down while the bat was being formed?

A. I may have done; I do not recollect that I ever did; I do not think I did.

X. 39. Was it the usual practice to move it up or down during the formation of a bat?

A. I think not.

X. 40. Was it not usual to adjust this piece up or down, and then leave it there for some time?

A. I am trying to think; my recollection of many of the things connected with the machine at that time are very indistinct; my impression is that it was.

X. 41. In what respect did the Burr & Taylor machine work better than the Wells?

A. Do you mean by that, in forming a better body?

X. 42. I mean, work better in any way.

A. I do not think that the Burr & Taylor machine works any better than the Wells machine did, so far as forming hat-bodies is concerned, when the Wells machine had a skillful or experienced operator to work it.

X. 43. How was it if the Wells machine had not a skillful operator to work it?

A. The bodies would usually be in accordance with his experience.

X. 44. Explain to me how an inexperienced operator would make poorer bats, and the experienced operator a better bat.

A. Because the experienced or skillful workman would know how to do his work in forming bodies; that is, in proceeding with his work, he would understand how to govern or to give direction to the fur by the hood, also attend to the feeding on, to see that it was done properly; while the unskillful operator, not understanding these things, of course could not accomplish the same things. At that time the coner, besides superintending the hood, gave directions for the feeding of the fur.

X. 45. When would they feed the fur the fastest in forming the body?

A. To form the body well, the fur should be fed on uniformly throughout.

280 X. 46. What directions would the coner give them, and when would he give it?

A. Sometimes the feeder would feed the fur on faster than others; sometimes also the feeder would feed bats on faster than at other times, making the textures of the body look coarse and uneven, of which at that time, when I worked in the factory, the coner or operator was expected to take cognizance, so that the body should appear even and uniform.

X. 47. Which part of the bat required the most care and skill?
A. I think it all required equal attention and skill in forming.

Direct resumed.

Q. 48. How many hat-bodies did you form per day on one of the first three of the Wells machines which you worked on in Hague street?

A. It would be somewnat difficult to arrive at a definite conclusion on that; I recollect at one time forming from 280 to 290 napping bodies per day for a week.

Q. 49. How do napping bodies compare with other bodies as to difficulty, or ease, of making?

A. They are much harder and more difficult.

Q. 50. How many persons did it require to tend one of those first Wells machines?

A. Three—one feeder, one coner, and one to wet the bats and take them off the cone, now called a slipper.

Q. 51. State whether or not the machine with the Burr & Taylor improvements requires a feeder, a coner, and a slipper.

A. They do.

Cross resumed.

X. 52. The difference between the Burr & Taylor machine and the Wells machine is, that in the Wells machine the character of the work done depends upon the skill of the coner, while in the Burr & Taylor machine the skill of the coner in regulating the deposit of the fur is not required. Is that so?

A. To a considerable extent.

X. 53. Did you ever see any Wells machine in which the hood was worked by machinery instead of by the hand of the coner?

281 A. No, I have not in operation; I think I saw one once in Mr. Taylor's exhausting-room. This was at the time he was experimenting on these machines in his machine-shop.

X. 54. You have said that you have made from 280 to 290 napping bodies per day. How many napping bodies would an unskilled workman make in a day with the Wells machine with a hood?

A. I have known other coners make from 250 to 290, but a large proportion of them, say from 25 to 75, would be spoiled, which of course would have to be counted from the good bodies to make the day's work.

X. 55. In what way would they be spoiled?

A. They would not be laid right; I mean by laid, the fur would not be distributed properly upon the cone, owing to the want of the skill of the workman in manipulating the hood

Direct resumed.

Q. 56. How long would it take a hatter acquainted with the proper form and weight of hat-body to learn to properly lay the fur by those old Wells machines?

A. If he was attentive to his business, a good workman, with good judgment, would require but a short time.

Cross resumed.

X. 57. By a good workman, I understand you to mean a good hatter?

A. I do.

WM. BYFIELD.

Subscribed and sworn to before me this 13th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Adjourned to 10 a. m. the 14th inst.

282 UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this fourteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, James B. Burton, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said James B. Burton being about the age of thirty-four years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said James B. Burton, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. James B. Burton; 34 years of age; reside in Orange, New Jersey, and by trade a hatter.

Q. 2. Do you carry on the business of selling hats, and where?

A. I do not carry on the manufacturing business. I am in
283 a house in Broadway, attending to their fur-hat manufacturing.

Q. 3. How long have you been employed in the business of manufacturing hats?

A. Since 1843, as an apprentice and journeyman, and as a manu-

facturer a part of the time. I have been a manufacturer on my own account from 1857 up to last spring.

Q. 4. State whether there are hats in use of a kind which could not be bowed by hand; and if yea, how many comparatively, and how are the bodies formed, and of what kinds they are.

(Objected to.)

A. I think there is. I suppose all the low grades of hats, running from seven dollars to nine dollars a dozen—soft hats. I suppose one-quarter of the hats men sell will run from twelve dollars down. These bodies are formed on machines. They are composed of fur, with a large percentage of fur known as short fur and clippings; some call it clippings, and some short fur.

Q. 5. Can hat-bodies which cost twenty-five cents be bowed by hands?

(Objected to.)

A. I believe not. I do not think there can be one bowed by hand, cost twenty-five cents for labor and stock when done.

Q. 6. Are the soft hats now in general use among what the trade call cheap hats?

A. Why, I would think a majority of the hats in use are what the trade would call cheap hats.

Q. 7. Will it cost less or more to do the balance of work on a hat-body which has been formed by a machine, than one which has been formed by hand-bowing?

A. I don't know that it will cost less, but it will require less mechanical skill than it would if the hat was bowed by hand. The reason is, that a machine does most uniform and even work, while a hat bowed by hand has invariably light spots in it, and there has to be great care taken in sizing to bring up those light spots so as to have a uniform body when it is completed.

Q. 8. Would not cheaper labor do for sizing a machine-body than would be required for the hand-bowed body?

(Objected to.)

284 A. I think it would; at least that has been the result of the introduction of machinery. There has been less intelligent labor used since their introduction.

Cross-examined by Mr. Harding, counsel for defendants.

X. 9. When did you begin to learn the trade of hatter?

A. In 1843. I was 16, nearly 17.

X. 10. Since when have you used hat-bodies formed by machinery?

A. I think the first hat-bodies that ever I worked was in 1848; that was the first work that ever I done on machine-bodies.

X. 11. Who made the bodies, and where were they made?

A. I can't tell who made them, nor where they were made.

X. 12. Who made any of the hat-bodies to which you refer?

A. From general report, they were made on Burr's machines. Of my own knowledge, I never see them made, and can't tell when they were made. You were speaking of the bodies made and used by me in 1848.

X. 13. Who made any of the bodies referred to by you in your examination in chief?

A. Mr. Burr, in New York.

X. 14. When?

A. At different times. I can't give the exact date.

X. 15. On what kind of machines were they made?

A. I have seen the machine they were made on, and have seen them made at different times on a hat-forming machine.

X. 16. Is that all the description you can give of the machine?

A. I think it is.

J. B. BURTON.

Subscribed and sworn to before me this 14th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

285 UNITED STATES OF AMERICA.
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this fourteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Andrew Comstock, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said Andrew Comstock being about the age of fifty-eight years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Andrew Comstock, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Andrew Comstock fifty-eight years of age reside in New York, and am in the hatting business.

Q. 2. How long have you been engaged in the hat manufacturing, and did you learn the business practically?

A. I commenced business in 1823, on my own account, and
286 have been in business ever since; I learned the business practically.

Q. 3. Give me some idea of the extent of your carrying on the business.

A. I think the last ten or twelve years we have made and vended from five hundred to six hundred hats per day.

Q. 4. How many men would it require to bow that quantity of hats by hand, and about what space of building would they require to work in?

(Objected to.)

A. From forty-five to sixty men, and would require about three thousand square feet to work in.

Q. 5. How do you have your hat-bodies made?

A. We have them formed on machines now. In the early part of our business they were bowed by hand.

Q. 6. What is the amount of saving produced by machine work in making hat-bodies?

A. We have formerly adjudged it to be about one-half; I think there is hardly that amount of percentage saved now.

Q. 7. In what kind of hats does it save the greatest percentage in the cost of them?

(Objected to.)

A. On the middle and lower grades.

Q. 8. State whether there are kinds of fur now used in the machine-forming which were not used when the hats were bowed by hand, and whether such could be used to any practical advantage in bowing by hand.

(Objected to.)

A. There is what is termed felt-fur or short fur, that is used in bodies formed on machines that could not be used in bodies bowed by hand advantageously.

Cross-examined by Mr. Harding, counsel for defendants.

X. 9. What is the cost of a hat-body, including the material—an ordinary body?

A. They will vary all the way from twenty-five cents to one hundred and fifty cents—that is, from the very cheapest to the best.

X. 10. What is the cost of a finished hat ready for the market.

287 A. The cost of fur hats will range from sixty cents up to five dollars apiece.

X. 11. What would be the cost of forming these bodies by hand and by machinery, relatively?

A. Heretofore we have generally supposed there would be a difference of about one-half, but owing to the cheapness of labor a less percentage than that would now cover the difference; the idea is that there is not quite a saving of half now.

X. 12. When was this cheapness of labor?

A. Since the rebellion came on, for the last five months. I should think labor would be one-third cheaper.

X. 13. Give me the difference in cost for making hat-bodies by hand and by machinery.

A. Well, at this present moment, owing to the prostration of business, I shouldn't think there could be a saving of more than thirty-three and a third per cent. The hat-body that would cost twelve cents to bow could be formed by machinery for one-third less—that would be eight cents.

X. 14. By the term "bow," do you mean hats made by hand?

A. I do.

X. 15. How would it have been before the war times?

A. Hand labor at that time was very much dearer. The difference would be about as eight to fourteen—that is, if made by machinery they would be about eight cents, and if made by hand about fourteen cents.

Direct resumed.

Q. 16. State whether it costs less or more to do the balance of the work to a hat which has been formed by a machine, than it does to do the balance of the work to a hat which has been formed by hand-bowing.

(Objected to.)

A. I don't see why there should be any material difference.

AND'W COMSTOCK.

Subscribed and sworn to before me this 14th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Adjourned to Tuesday, the 17th instant, at 10 a. m.

288 UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered that on this seventeenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Lucius E. Rockwell, to testify and the truth to say, on the

part and behalf of the complainant, in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits.

And the said Lucius E. Rockwell being about the age of thirty-one years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Lucius E. Rockwell, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Lucius E. Rockwell; 31 years of age nearly; reside in New York, and am a machinist and engineer.

Q. 2. Do you work for the complainant, Mr. Burr?

A. I do.

Q. 3. How long have you worked for him?

289 A. Eight years, next December.

Q. 4. Have you built a hat-body forming machine for Duryee, Jaques and Co., at Mr. Burr's factory, since you worked for him; and if yea, when?

A. Yes, sir; in February, 1858.

Q. 5. Were Mr. Burr and Mr. Jaques both present at any time where the machine was, after it was completed? and if they were, state whether they came together, and what Mr. Burr said, if any thing, to Mr. Jaques.

(Objected to.)

A. They both came in the machine-shop together. Mr. Burr said, pointing to the machine, that it was as good a machine as he could get up. Mr. Jaques said, he was very busy, and would like to have it sent out to him as soon as possible. Mr. Burr told him that he could not let him have that machine until he sent back one of the old ones. In a few days after the old machine came, and it was taken in the shop, and the new one was put into the cart and taken to Newark. Mr. Wright told me the same afternoon, after it went away, to go to Newark and put this new machine up. I done so, and started the machine, and the foreman of Mr. Jaques's concern did some work on it. I staid there until Mr. Jaques said he was well satisfied with the machine, and I then came back to New York.

Q. 6. Do you mean that the new machine was sent by the same cart or wagon that brought the old one?

A. Yes, sir.

Q. 7. How long after the new machine was sent before you put it up in defendants' factory?

(Objected to.)

A. I put it up the next day in the morning after the machine left New York. I went to work at it the next day, in the morning, to put it up, and it took me all that day, and till ten o'clock at night and part of the next day, to get it up.

LUCIUS E. ROCKWELL.

Cross-examined by Mr. Harding, counsel for the defendants.

X. 8. How long were you building this machine?

A. I couldn't say exactly. As soon as we could build it, in
290 going along with it. We didn't delay. We built the machine as soon as we could.

X. 9. Who gave you directions to build the machine?

A. H. A. Burr.

X. 10. Do you know the cost of the machine?

A. I can say what I thought they were worth. I should think they were worth between $550 and $650. I mean they would cost that to build them. That particular machine would cost close to six hundred dollars to get it up.

LUCIUS E. ROCKWELL.

Subscribed and sworn to befor me this 17th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York. ss:

Be it remembered that on this seventeenth day of September in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, Alva B. Taylor, to testify and the truth to say, on the part and behalf of the complainant, in three certain suits or matters
291 of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said Alva B. Taylor being about the age of fifty-seven years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversey aforesaid, I did carefully examine the said Alva B. Taylor, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Alva B. Taylor; fifty-seven years of age; reside in Newark, New Jersey, and am a machinist.

Q. 2. Are you the Alva B. Taylor who was once interested in the patent for hat-body forming machines, and were you one of the parties of the first part to an agreement made between Charles St. John, Henry A. Burr, and Alva B. Taylor, and Norman Reynolds of the first part, and Peter S. Duryee, James Pinneo, Isaac N. Rankin, and Henry H. Jaques, of the second part, and dated the seventh day of November, 1848?

A. I am the person alluded to in that question, and am one of the parties of the first part to that agreement.

Q. 3. By whom was that agreement chiefly negotiated on both sides?

A. Henry H. Jaques on the part of the parties of the second part, and myself on the part of the parties of the first part, attended to the negotiation.

Q. 4. What was the chief inducement to the parties of the first part to make that agreement?

A. It was for the benefit of the influence of Rankin, Duryee and Co., in introducing the machine or the work of the machines to the trade, and for their influence in sustaining the patents and save litigation, which was given by Mr. Jaques to me as an inducement to accept his proposition for the small consideration of money, as license fees.

Q. 5. Was anything promised respecting such influence on the part of the parties of the second part; and if yea, by whom, and what was promised?

292 A. There was, by Mr. Jaques; and that they would use their influence to assist us in every possible way in their power.

Q. 6. How frequently did you and Mr. Jaques talk upon that subject?

A. Well, it was quite frequently; once in two or three days; perhaps oftener.

Q. 7. How came those interested with you in the patent to enter into that agreement?

A. It was through my conversation with them, stating the necessity of getting the influence of some such manufacturing establishment to assist us in introducing the work to the trade, and their influence in sustaining the patent; that aid having been volunteered by Mr. Jaques to me as an inducement to granting a license.

Q. 8. How extensive, comparatively, was the business of Rankin, Duryee & Co.?

A. In my estimation, they stood first in the country as hat manufacturers in influence and in amount of business.

Q. 9. State, if you know, how the hinged flap at the bottom of the delivery end of the trunk was used in the Wells machines which were operated in Hague street, without the Burr and Taylor improvement; that is, whether it was moved while a hat-body was being formed, or when it was moved, and for what purpose?

A. It was used to regulate the deposit of fur on different sized

cones, or the lower part of the cone; and when adjusted for each size, it was left to remain stationary.

Q. 10. After so adjusted, when would it be removed again?

A. On putting on a different cone; that is, a different size.

Mr. Harding not having come in till after the examination of the witness in chief, Mr. Gifford consents that he may take any objection to it at the hearing which he may elect to do.

Cross-examined by Mr. Harding, counsel for the defendants.

X. 11. In what year did this conversation between yourself and Mr. Jaques take place?

A. In 1848

X. 12. Had any one infringed this patent at the time of this conversation—I mean the patent of Wells?

293 A. There had.

X. 13. Who?

A. Aaron Peck and Israel D. Condit.

X. 14. Were they sued?

A. They were.

X. 15. Were they licensed under the Wells patent?

A. I am not positive whether they were licensed at that time or not; they were afterwards.

X. 16. What did they pay?

A. They were to pay—that will require some explanation. In our suit with them we found that Mr. Wells had made a former agreement with Mr. Peck, or Peck and Condit, not to use any part of a machine which he had formerly sold them. My impressions are, that they were to have it for a certain length of time at one cent a body tariff. The length of that time I do not know. It was the advice of counsel that we should make such arrangements, under the circumstances; he, Mr. Wells, using a portion of the machine which he had formerly sold to them, to wit, the exhaust.

X. 17. What was the patent under which Mr. Wells claimed the exhaust which he had agreed not to use?

A. The patent of Wells; Wells & Peck, I think.

X. 18. In what way was this exhaust used, which he agreed not to use?

A. It was used in what was generally known as the Blanchard machine.

X. 19. When was this agreement made with Peck and Condit; I mean the license under the Wells patent?

A. I don't remember the date of it.

X. 20. When did you become interested in the Wells patent?

A. I became a part proprietor before the patent was issued.

X. 21. When did you begin to run the machine?

A. I don't remember the date.

X. 22. How long did you run it before the Burr & Taylor improvement was added?

A. I think some six or eight months, but am not positive.

X. 23. Was the Wells machine run before the Wells patent was issued?

294 A. It was.

X. 24. How long before?

A. I don't remember.

X. 25. Was not the deposit of the fur fibre regulated by the hinged deflector or flap placed at the lower part of the delivery aperture of the trunk, which flap was adjustable by hand in the Wells machine?

A. It was on the lower part of the cone.

X. 26. Was the Wells machine able to suit the demand of the trade in the manufacture of hat-bodies?

A. That is a question I cannot answer in full. It suited those that we worked for, or most of them. There were others, from prejudice or some other cause, that would not have any work formed on them.

X. 27. You understand my question as meaning the Wells machine, as distinguisned from the Burr and Taylor machine?

A. I do.

X. 28. Is it not important, in making many kinds of hats, that the tip and crown should be thin, and that part of the body which is to form the angle at the junction of the tip and crown should be thick, to give the required strength and durability to that part of the hat which is next to the brim, most exposed to wear and fracture?

(Objected to by complainant's counsel, as the witness is neither a hatter nor an expert in hats, and has not been examined as such.)

A. I have heard hatters say that it required that. That is all I know about it. I have never worked on hats.

X. 29. On the Wells machine, whether the hinged deflectors were operated by hand or by machinery, could this be effected to the satisfaction of the trade?

A. They can, with a skillful hand.

X. 30. Did you not encounter formidable objections at the incipiency of the business, when all persons in the trade were making every effort to condemn this innovating method of forming hats?

(Objected to, because it assumes what has not been shown, to wit, that *all* persons in the trade were making *every* effort to condemn that method in forming hats.)

295 A. That question, as it stands, I cannot answer, for the reason that they were not all opposing the introduction of machine-made bodies.

X. 31. Were there not formidable objections encountered by you from the trade at the incipiency of the business?

A. There was by a portion of them.

X. 32. Why?

A. In my opinion, more from prejudice than anything else.

X. 33. Could you, with a Wells machine, make any number of bats all alike?

A. Of the same size I could do it.

X. 34. Did not Henry A. Wells and the machinist try a great number of experiments or plans to perfect the machine, so as to

enable it to better suit the demand of the trade in the manufacture of bats?

A. There was a good many experiments tried to perfect the machine. It was done to suit the trade, as a matter of course, but it was done more to suit the fancy of Mr. Wells.

X. 35. On the Wells machine could the bats be formed efficiently to the satisfaction of the trade by operating the deflector or hood by machinery?

A. I have no doubt it could.

X. 36. Was it ever done?

A. I don't know.

X. 37. Was it ever attempted to be done, or tried?

A. I don't know that it was. I don't recollect about it.

X. 38. Can you swear that you never saw it tried?

A. I have no recollection of ever seeing it tried.

X. 39. Were you the machinist that built the Wells machine?

A. The first machine I did not build. The others I did build.

X. 40. When did you begin to build—before the patent?

A. Yes.

X. 41. Did you see the first machine that was built?

A. I do not know. The first machine that I saw was brought to my place, and put in operation. Whether that was the first or not I cannot answer.

296 X. 42. Who put that machine in operation, or operated it?

A. St. John, Burr & Co., I think, was the title of the firm.

X. 43. Did Henry A. Wells superintend the operation of that machine?

A. In part he did.

X. 44. Had that machine any automatic arrangement for operating the hood?

A. It had none to my recollection.

X. 45. Did any of the machines which you built ever have any automatic arrangement for operating the hood?

A. I have no recollection of any except the model sent to the Patent Office.

X. 46. Did you make that model?

A. I did.

X. 47. Was not the Burr & Taylor improvement the result of a great deal of experiment and expense on your part and that of Mr. Burr?

A. It was.

X. 48. What was the difficulty with the Wells machine that prompted you to encounter this expense and experiment?

A. It was the difficulty of getting competent men as coners to lay the bats properly with the movements of the hood, and to make a trunk that we could alter to any sized cone.

X. 49. Did the introduction of the Burr & Taylor improvement diminish the expense of manufacturing hat-bodies as compared with the Wells machine?

A. It did materially.

X. 50. Did you run the Burr & Taylor machine faster than the Wells machine?

A. We did not run the machine any faster.

X. 51. Did you make more bats with the Burr & Taylor than the Wells machine per day?

A. We did.

X. 52. How many more?

A. Well, I think there was an increase of from 20 to 25 per cent.

X. 53. Why was this if the machine ran no faster?

A. For a lot of hats, the mouth of the trunk put in the right shape and size—when once set, it was right for the whole lot. They could be run off without any change.

297 X. 54. Could a lot be formed any faster on the Burr & Taylor than on the Wells machine?

A. That would depend upon the number and size.

X. 55. Could a lot of a given size be formed in the Burr & Taylor machine faster than in the Wells machine?

A. That would depend upon the number in the lot.

X. 56. Could a lot of a given number and size be formed on the Burr & Taylor machine quicker than on the Wells?

A. That would depend upon the size of the lot.

X. 57. Explain yourself.

A. In forming a lot of half a dozen or a dozen, they could be formed as quick or quicker on the Wells machine than on the other. But, in forming a lot of fifty or a hundred dozen, the Burr & Taylor machines would have a large advantage, and they could be formed much quicker.

X. 58. Explain how a lot of fifty or a hundred dozen could be formed faster on the Burr & Taylor than on the Wells machine?

A. With the Wells machine, where we have the advantage of the hood, we could run the small lot while we were setting the mouth-piece of the Burr & Taylor machine to do the work properly.

X. 59. Question repeated.

A. The mouth-piece of the Burr & Taylor machine being set in the right position, there is nothing to interfere with the work, as fast as it can be fed to the machine

X. 60. What retarded the formation of the bat or interfered with the work being done as fast as it could be fed to the machine in the Wells?

(Counsel for complainant objects to the question, upon the ground that it is not a cross-examination upon anything put forth in the examination in chief, and it does not appear that the witness ever used either of the machines to form hat-bodies, or ever timed others in using them, or that he is competent to speak as an expert on that subject.)

A. The inexperience and negligence of the coner, or inability to perform his work properly.

X. 61. To what extent did the Burr & Taylor improvement increase the profits of your business?

298 (Counsel for the complainant objects to the question, because it calls for an answer which, from the nature of the case, could

not be given without a mere guess, for the reason that the progressive adoption of the machine-work, and the increasing favor with which it was received, would render it impossible to say what part of the profits would be due to that cause; and for the further reason that the machine inquired of was a Wells machine, with the Burr & Taylor improvements, and it would be impossible, therefore, to definitely determine the extent to which they would relatively increase or diminish the profits of the business; and for the further reason that the question is too general, not being limited to any particular time.)

A. I do not know.

X. 62. Who drew the agreement between Henry A. Burr, St. John, Alva B. Taylor, and Norman Reynolds, of the first part, and Peter S Duryee, and others, of the second part, of 7th of November, 1848?

A. I do not remember.

X. 63. Was it not submitted to the counsel of your firm?

A. I cannot answer that question. I don't recollect.

X. 64 Did you not a moment ago say that you presumed it was submitted to the counsel on behalf of the firm?

A. I did.

X. 65. Why did you presume so?

A. Because we were in the habit of submitting things of that nature to our counsel.

X. 66. Was not this agreement considered or examined by the firm before they signed it?

A. I presume it was

X. 67. Was you not satisfied with this agreement at the time you signed it?

A. Not fully, from the fact that I thought we were not getting full compensation for the benefit of the license?

X. 68. Did you arrange the terms of the agreement with Mr. Jaques?

A. I did.

X. 69. Did you propose the clauses of forfeiture and the other things to be done on his part, and his associates' part, contained in said deed?

299 A. I don't recollect who made the suggestion or proposition.

X. 70. Were you aware of the defendants having built a Burr and Taylor machine at any time?

A. I have seen a machine in their factory that was not built from Mr. Burr's or my patterns for the frame; where it was built I know not.

X. 71. Was the business of making hat-bodies, as carried on by you during the years 1845, 1846, 1847, and 1848, profitable?

A. I cannot answer that question, from the fact that I am not posted how the accounts stood at the expiration of that time.

X. 72. Did you join with Henry A. Burr in making an application for an extension of letters patent granted to you on the 9th of February, 1847, for improvement in machinery for forming hat-bodies?

A. I did.

X. 73. Did you join with the said Henry A. Burr in making a sworn statement in the said application?

A. I did.

X. 74. When was the validity of the Wells patent disputed to your knowledge first?

(Objected to as not being a cross-examination to any examination in chief.)

A. I do not remember.

X. 75. When was the first time that you do remember the validity of it being disputed?

(Same objection.)

A. The time I do not remember, but it was in the case of Peck and Condit.

X. 76. Who were the plaintiffs in this suit against Peck and Condit?

A. St. John, Burr & Co

X. 77. In what court?

A. In the United States circuit court for the district of New Jersey.

X 78 Did you not, in said affidavit mentioned in cross question 73, state it is important, in making many kinds of hats, that the tip and crown should be thin, and that part of the body which is
300 to form the angle at the junction of the tip and crown should be thick, to give the required strength and durability to that part of the hat which is next to the brim, the most exposed to wear and fracture; and that on the Wells machine, whether the hinged deflectors were operated by hand or by machinery, this could not be effected to the satisfaction of the trade? And if you did so state, was it true?

(Mr. Harding hands the witness a certified copy of the statement, filed in the matter of the application of Alva B. Taylor and Henry A. Burr.

Counsel for the complainant objects to the question on the following grounds: 1st. It is not a cross-examination on any part of the examination in chief. 2d. It is on new matter on which the defendants' counsel has made the witness his own witness. 3d. It is not the proper way, in proving a fact, to ask the witness if at some other time, and under other circumstances, he had stated such fact. 4th. It is an attempt by the counsel to contradict his own witness. 5th. The question is irrelevant, and any such statement on the subject-matter of such statement as is inquired of by the question is irrelevant and inadmissible, because it does not appear that the witness is a hatter, or has ever made hats, and therefore cannot testify as an expert.)

A. I don't recollect whether I stated it or not. If I did so state it, I supposed it to be true.

X. 79. Were you the owner of the patents, or either of them, under which the machine of George E. Cowperthwaite, for which he was sued by Henry A. Burr and others, in the district of Connecticut, were used?

(Objected to as not being a cross-examination.)

A. I was the owner previous to that, but at the time I was not.

X. 80 Did you contribute to the expenses of that suit?

(Same objection.)

A. I did not.

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(Counsel for the complainant proceeds to cross-examine the witness on some of the matters wherein he has been made a witness for the defendants, and the examination has been one in chief in their behalf.)

301 Q. 81. In answer to the question 18, "In what way was the exhaust used which he agreed not to use?" you said: "It was used in what was generally known as the Blanchard machine." Do you mean by that that it was used as described in the Blanchard patent?

A. I did.

Q. 82. In answer to the 70th question you say, in substance, that you have seen a Burr and Taylor machine in defendants' factory that was not built from Mr. Burr's or your patterns for the frames. State, if you please, in what part of the factory you saw it, and whether it was in operation, and whether there were any other Burr and Taylor machines in the same room, and when you saw it.

A. It was in his regular forming machine-room, where I have seen machines before, in the first story above ground. It was in operation; and there was another machine standing there at the time, of Mr. Burr's make. The latter was not in operation, but it appeared to be in operating order. I think I saw it in April, last spring.

Q. 83. Are you a hatter?

A. I am not.

Q. 84. Do you consider yourself qualified to judge of the quality of hat-bodies?

A. I do not.

Cross-examined by Mr. Harding.

X. 85. How long were you a copartner with St. John and Burr in running hat-body machines?

A. I couldn't answer that without referring to the books.

X. 86. Were you not interested as such copartner from 1845 to 1854, or thereabouts?

A. I think I was. I forget the time of sale.

X. 87. Do you know of the defendants using more than two Burr machines?

A. I do not.

Direct resumed.

Q. 88. Have you ever personally formed hat-bodies on any machine?

A. I have not.

Cross resumed by Mr. Harding.

302 X. 89. Did you not experiment about a year in making the Burr and Taylor improvements on the Wells machine?

A. I experimented for a long time; the limit of time I can't name.

A. B. TAYLOR.

Subscribed and sworn to before me this 17th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Adjourned to 10 a. m. the 18th instant.

303 Defendants counsel gives in evidence a certified copy of the record of the Patent Office in the matter of the application of Thomas R. Williams for the letters patent of the United States, which were issued April 24, 1840, marked Exhibit No. 5, consisting of original specification with erasures and interlineations, letters of T. R. Williams, dated May 15, 1839; Berry to Ellsworth, dated May 16, 1839; Commissioner of Patents to T. R. Williams, December 31, 1839; Ellsworth to Williams, March 24, 1840; file wrapper.

The counsel for complainant objects to the introduction of the record, and to each part of the same, offered by the defendants' counsel, and marked Exhibit 5, upon the ground that the same is not competent evidence, and that none of the facts constituting the record are admissible as evidence; also, that the same is not sufficiently authenticated, and that there is no law authorizing the admission in evidence on a certificate of the Commissioner of Patents, with the seal of the Patent Office.

DEFENDANTS' EXHIBIT No. 5.

The United States Patent Office to all persons to whom these presents shall come, greeting:

This is to certify that the annexed are true copies from the files and records of this office, of all papers now on file or record, including drawings, (except letters patent as issued,) in the matter of the application of Thomas R. Williams for letters patent for "improvement in machinery for the manufacture of stuffs in which the fibres of various materials are united with adhesive mixtures," patented, in compliance with said application, April 24th, 1840. The said copies show the erasures, interlineations, and marginal notes as they appear in the original.

In testimony whereof, I, S. T. Shugert, acting Commissioner of Patents, have *have* caused the seal of the Patent Office to be [L. S.] hereunto affixed this thirteenth day of March, in the year of our Lord one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-fifth.

S T. SHUGERT.

304 *To the Commissioner of Patents for the promotion of the useful arts in the United States of America:*

The petition of Thomas Robinson Williams, a citizen of the United States of America, now residing at No. 14 Lamb's Buildings, Bunhill Row, in the city of London, gentleman, but late of Newport, Rhode Island, in the said United States, respectfully represents, that your petitioner has invented or discovered a new and useful invention of "a new method of combining, by means of machinery and adhesive compositions, all kinds of fibrous materials, such as cotton, silk, flax, hemp, tow, fur, wool, hair, etc., into manufactured articles, which may be applied to the purposes for which paper, pasteboard, millboard, papier-maché, parchment, vellum, leather, woven fabrics, felt, floor-cloth, tarpaulin, and the skins of animals are used;" that the

said invention has not been used or known by others previously to the invention or discovery thereof by your petitioner. He therefore prays that letters patent of the United States may be granted to him therefor, securing to him, his heirs, administrators, or assigns, the exclusive right to make and use, and to vend to others to be made and used, his said invention or discovery, upon the terms and conditions provided in the act of the Congress of the United States relating thereto, your petitioner having paid thirty dollars into the treasury of the United States, and complied with other provisions of the said act.

THOS. R. WILLIAMS.

Witnesses:

JAMES MCCURLEY,
JOSEPH MARQUETI,
Clerks in the Consulate United States, London.

To all whom it may concern: Be it known that I, Thomas Robinson Williams, a citizen of the United States of America, late of Newport, Rhode Island, in the said United States, but now residing at No. 14 Lamb's Buildings, Bunhill Row, in the city of London and kingdom of England, gentleman, have invented or discovered a new and useful invention of "a new method of combining, by means of machinery and adhesive compositions, all kinds of fibrous materials, such as cotton, silk, flax, hemp, tow, fur, wool, hair, etc., into manufactured articles, which may be applied to the purposes for which
305 paper, pasteboard, millboard, papier-maché, parchment, vellum, leather, woven fabrics, felt, floor-cloth, tarpaulin, and the skins of animals are used;" and I do hereby declare that the following is a full and exact description thereof:

This invention consists in a new method, process, or manner of combining fibrous materials, so as to form sheets or pieces of material commonly called or known by the name of artificial skins, or other articles, as hat-bodies, forms or foundations of tea-trays, boxes, and various other articles, which are or may be constructed of such materials by means of machinery and adhesive mixtures. The fibrous materials are first partially separated or opened and suspended in the air, and are then drawn upon, deposited, or laid on woven wire gauze or perforated cylinders or sheets or forms of metal or wood or woven cloth of an open fabric or network, such wire gauze or perforated plates or forms being of the requisite shape to suit the articles intended to be manufactured, and which operation is effected by means of a partial exhaustion of the air underneath or on the opposite side of the said woven wire-gauze or other fabric or perforated plates or shapes, the fibrous materials being drawn upon and caused to be deposited over the same by the currents of air passing through the said wire gauze or perforated plates or forms, which arrest the fibres, and thereby form a bat or sheet or other shape of the said fibrous material (generally upon its upper surface) according to the shape or form of the woven wire gauze or perforated plates or forms wherein or underneath which the exhaustion takes place. The so laid fibrous materials are afterwards saturated in adhesive compositions, whereby the combination

of the fibrous materials, with the assistance of pressure, is completed, the fibres being principally held together by the said compositions.

In effecting these operations, some machinery which is well known may be made use of, and machinery consisting of parts and modifications of different machines well known, may be combined and connected together for effecting these purposes; and I therefore wish it to be understood that I do not intend to confine myself to the precise arrangement and construction herein shown, and I shall therefore refer
306 in the present description to such machinery as I have found to answer well for making the materials as above stated, into sheets or lengths or pieces, and then allude to the further modifications of this novel method of combining fibrous materials in the process of making hat-bodies or other articles; and it may render the subject of this invention more clearly understood by observing that this new method or process of combining fibrous materials is in contradistinction to the present mode of reducing fibrous materials into a state of pulp suspended in water, as is done in the manufacture of paper; also to the process of spinning and weaving, as in woven fabrics; and also to the ordinary process of felting, as furs, wools, hairs, and other animal substances are usually felted together. And I shall now proceed to describe the manner in which the said invention is performed or carried into effect, referring to the annnexed drawings, which are different views of machinery or apparatus now in operation for making the said materials first in sheets or lengths.

Fig. 1 is a side elevation of the machinery or apparatus complete.

Fig. 2 is a vertical section taken longitudinally through the same.

Fig. 3 is a plan or horizontal view—the red arrows in all these figures indicating the passage of the air through the apparatus, and the blue arrows that of the material under operation, and the black arrows the direction in which the various straps or bands and wheels or cylinders revolve or travel; *a a* is the framework of the machinery, which in this instance is formed of cast iron, closely cased or panneled air-tight or nearly so with wood, *b b*, on all sides excepting the end underneath the feeding apparatus, which is open for the admission of the atmosphere; *c c* is the endless feeding-belt upon which the fibrous material, as hemp, tow, flax, refuse silk, cotton, etc., is spread evenly by hand in the ordinary manner. The feeding-belt, in this instance, is composed of two endless leather straps, one at each side, passing over the rollers *d d*; the leather straps are connected together by rods or bars of wood, having spaces between them for the purpose of allowing any dirt or other extraneous matters mixed with the materials falling through the same without being carried into the
307 machine; *e e* are a pair of feeding-rollers which take the fibrous material from the feeding-belt, and present it to the action of the teeth of the opening cylinder *f*, (commonly called the "devil cylinder.") The upper feeding-roller is pressed upon the lower one by weighted levers and rods at *g g*, and these rollers are made to revolve by means of toothed pinions on their ends, as shown in the drawings, which is set in motion by a strap or band *h* passed over a pulley on the axle of the lower roller from any convenient part of the machinery. From one of these pinions an intermediate toothed wheel gives motion to

another wheel on the end of the roller *d*, thereby causing that roller to revolve, and with it the endless feeding-belt. The axle of the devil cylinder *f* is mounted, turning in proper bearings in the frame-work, and the cylinder is constructed of iron arms and rims covered with blocks or staves of wood, through which are driven a great number of iron or steel spikes or teeth, which project from the periphery of the cylinder very near to the feeding-rollers *e e*. This cylinder has a very rapid rotary motion given to it by means of a band passed from the main driving-shaft over the pulley or rigger *h* on its axis. The feeding-rollers bring the material into the machine, and the teeth of the cylinder separate or open the fibres, throwing the material into the air, as shown by the blue arrows, where, meeting with the current of air caused by the partial vacuum produced within and under the receiving-cylinder *i*, the loosened fibres are drawn on to, and deposited upon, the periphery of this cylinder in the form of a thin layer, sheet, or bat of fibrous material, from whence it is taken by the receiving-rollers *k k*, as hereafter described. The cylinder *i* is formed of iron arms or rims covered with an endless cloth of woven wire gauze, perforated zinc or iron or tin plates, or other material or fabric which will allow of the passage of the air through it, but at the same time stop or arrest the fibrous substances mixed with or suspended in the air. The cylinder *i* and the receiving-rollers *k k* have a slow uniform rotatory motion given to them by means of a band passed from a rigger *l* upon the auxiliary shaft to the rigger *m*, upon the axle of which is a toothed pinion taking into gear with a toothed wheel *n* mounted
308 upon the axle of the lower receiving-roller *k*, and upon this axle is a pinion taking into an intermediate wheel *o*, the teeth of which take into gear with another wheel *p* mounted upon the end of the axle of the cylinder *i*, and thereby give it a slow rotatory motion in unison with that of the receiving-rollers *k k*.

The partial vacuum or exhaustion of the air is produced within and under the cylinder *i* by means of the rotary fan or exhauster at *q*, (or any other exhausting apparatus,) but which in this instance for simplicity of application is shown placed under and in direct action with the cylinder *i* within an air-tight box or casing *r*. The fan is made to revolve rapidly by bands passed over riggers in any convenient manner; but when several of these machines are placed in a row on one floor of a building, I prefer connecting the exhauster with an air-tight trunk, situated underneath the floor, extending the whole length of the machines, and exhaust the air therein by means of a large fan or blower situate at one end of the trunk or in any other convenient part of the building, a space around its centre, as shown in the drawing at *u u*, being open to the trunk, and its periphery open to the atmosphere.

The extent of surface of the periphery of the cylinder *i*, through which the air is allowed to pass, is determined by the shield or partition *s s*, which is placed as a guide for the current of air therein, and is packed against the cylinder *i* at *t* by means of a leather or other suitable substance, in order to prevent the air and fibrous materials passing between it and the cylinder. The lower receiving-roller is placed nearly in contact with the opposite side of the cylinder, and

does not require packing. The receiving-rollers *k k* are connected together by means of pinions on their ends, and the upper one is pressed down upon its companion by weighted levers and rods *K K*, and as they receive the sheet, layer, or bat of fibrous materials from the cylinder *i*, they press it into a more compact body and deliver it to the apparatus, where it is to be saturated with pitch and tar or other resinous, gelatinous, or adhesive compositions, as shown in the drawings at fig. 4; *v v* are two hollow cast-iron cylinders or rollers mounted in proper bearings in the framing *w w*, and are warmed when
309 required, by means of hot iron heaters or in any other convenient manner; *x x** are troughs containing the adhesive mixture or composition, which is kept fluid by the radiant heat from the rollers; *y* is another trough containing the same composition, for the purpose of supplying the lower one *x**. The lower cylinder *v*, being partially immersed in the composition, carries up with it a sufficient quantity to saturate the under side of the sheet or bat of fibrous materials, and the composition in the trough *x**, being in direct contact with the sheet or bat, saturates the upper side as it passes under it. The upper heated cylinder is pressed upon the lower one by means of weighted levers at *z z*, and as they revolve, they not only squeeze or force the composition or adhesive mixture through the sheet or bat, but also press out all that may be superfluous, which again runs into the lower cistern *x*. These rollers also press the sheet or bat of fibrous materials so saturated into a thinner or more compact body, and the composition immediately cooling, retains the fibres in that state; and as the sheet of material cools, it may be cut into any convenient sizes for the purposes required, or continued onwards into succeeding operations, to be afterwards described. I should here remark, that the adhesive mixture generally used in this part of the process is about three parts of pitch or rosin with about one part of tar, to which is added, perhaps, a thirtieth of oil or tallow; but the proportions necessarily vary for the different purposes for which it may be intended.

The cylinders *v v* are made to revolve by means of a band passed from a rigger on the auxiliary shaft to the pulley 1, placed upon the axle 2, which is mounted in the frame work 3. Upon this shaft is a toothed pinion 4 taking into the wheel 5 upon the end of the axle of the lower roller *v*, the upper one being turned by a pair of pinions upon the ends of the shafts of the rollers.

Having now described the means of carrying this invention into effect in the making of sheets or lengths of fibrous materials, which are applicable to the sheathing of ships, covering the roofs of buildings, floor-cloth, packing for the chairs of rails for railways, tarpaulins, and other purposes, I will proceed to describe another ap-
310 plication of this invention for the manufacture of millboards or boards for bookbinding, making boxes, and packing for flanch-joints in pipes and joints for tanks and machinery in general. For this purpose I make use of an additional machine, fig. 5, appended to that last described, through which the endless sheet, after leaving the pressing-rollers *v*, is conducted over the roller *b*, (receiving a motion from the band *c*,) and from this it descends into the cistern *D*, which is filled to the line *d*, with a composition of weak size mixed with

paste and clay in different proportions, (according to the material required,) through which it is made to pass over and under the rollers *e e e* by the drawing of the two larger geared rollers *E E*, which are covered with a coarse woolen or hair cloth, and gently press out (by means of the weighted levers *f f*) so much of the superfluous composition as may be wished; it is then continued over the roller *g*, and is afterwards cut off into various lengths and hung up to dry, it being finished when dry by the usual methods of glazing or finishing millboards or cardboards, by rolling or pressing.

The rollers *E E* receive their motion by a band from an auxiliary shaft under the floor or in any convenient situation.

The advantage of thus supersaturating the previous sheet with this composition is to prevent the action of heat upon the so manufactured boards.

[For the manufacture of hat-bodies and other irregular forms, I generally use the following arrangement of machinery and process, first remarking that it will be evident the fibrous materials may be deposited upon, and consequently take the form (whatever that may be) of various woven wire gauze or perforated shapes or plates; for as the materials are mixed with or suspended in the air, and are only arrested or stopped by the said wire gauze or perforated shapes or plates, the materials will be drawn upon and deposited over all part of the same through which the current of air is allowed to pass; therefore any other form may be placed in the situation of the cylinder *i*, but in this case it is not necessary to inclose the forms in casing, as shown in the preceding figures, and the delivering-rollers *k k* are not required.

Fig. 6 is a side elevation of a carding-engine with this invention applied thereto, for the purpose of making hat-bodies or foundations. A represents a carding-engine of the ordinary construction; *B* the doffer cylinder, the material being removed, thrown, or blown from it by the revolving fan or beater *C*. The rotatory fan or other exhausting apparatus is placed at D; within a casing E is a box, from which the air is also partially exhausted, and this box, in this instance, is made so that it may be turned upon its centre at bottom by means of a circular rim fitting into a hole in the casing of the exhausting-fan, for the purpose of presenting first one and then another of the forms to the material. On the top of the box E other similar openings are formed, upon which are placed the required forms of woven wire gauze or perforated shapes; for example, two different-shaped forms used in hat-making are shown applied in this figure. These forms are movable, and rest upon toothed wheels at their lower ends, the centers of which are open for the air to pass through, but are kept in their places by rims on their under sides similar to that of the exhausting-box E. These forms receive a slow rotatory motion from an upright spindle *d* and pinion *e* placed over the center of the box E. As the fibrous material is thrown or blown from the carding-engine or other apparatus for separating or opening the fibres, it is drawn by the current of air caused by the exhaustion upon the form, where it it arrested; and when a sufficient quantity of the fibrous material has been deposited upon one shape and form, another

311

shape, made in two halves, (when its form requires it,) as that shown at fig. 7, is placed over the material and the inner form, and the whole removed together and dipped into the adhesive composition, (generally of weak size or a solution of shellac,) which saturates it. The material, thus combined, is taken from the forms and dried.

If the forms for hat-bodies are required for felting, they are removed to another machine, where they undergo the process of basoning or hardening whilst between the forms.*]

The forms may be made of any perforated substance of sufficient strength, but I prefer them of copper, zinc, or wire gauze.

Having thus fully described my method of combining, by means of machinery and adhesive compositions, all kinds of fibrous materials for the manufacture of various articles, I do hereby declare that
312 I do not claim the forming of a bat or sheet from fibrous materials in the manner set forth; nor do I claim the machinery employed for the saturating of such a bat or sheet of fibrous materials with resinous and other substances; but what I do claim as of my invention, and desire to secure by letters patent, is the so combining and arranging the machinery, employed substantially in the manner herein set forth, as that the processes of forming the bat and of saturating the same with the different compounds shall be simultaneously and consecutively effected, so as to form sheets or lengths of fibrous materials applicable to various purposes. [I also claim the forming of hat-bodies or foundations of hats and other articles of a similar nature by causing the fibrous materials to be deposited upon suitably shaped forms of perforated metal or wire gauze, etc., and otherwise treated in the manner herein described.*]

In witness whereof, I, the said Thomas Robinson Williams, have hereunto set my hand and seal, this 12th day of February, in the year of our Lord one thousand eight hundred and forty.

[L. S.]

THOS. R. WILLIAMS.

Witnesses:

JOHN CLARKE,

GEORGE HARRIS,

Draftsmen to Messrs. Newton & Berry, 66 Chancery Lane, London.

On this seventeenth day of March, one thousand eight hundred and thirty-eight, before the subscriber, lord mayor of the city of London, in Great Britain, personally appeared the within-named Thomas Robinson Williams, and made solemn oath that he verily believes himself to be the original and first discoverer of the within-described invention of "a new method of combining, by means of machinery and adhesive compositions, all kinds of fibrous materials, such as cotton, silk, flax, hemp, tow, fur, wool, hair, etc., into manufactured articles which may be applied to the purposes for which paper, pasteboard,
313 millboard, papier-maché, parchment, vellum, leather, woven fabrics, felt, floor-cloth, tarpaulin, and the skins of animals

* Erased in the original.

are used;" that he does not know or believe that the same has ever before been used or known; and that he is a citizen of the United States of America.

THOS. R. WILLIAMS.

Sworn at the Mansion House, in the city of London, this seventeenth day of March, 1838, before me.

J. COWAN, *Mayor.*

CONSULATE OF THE UNITED STATES OF AMERICA, *London.*

I, Thomas Aspinwall, consul of the United States of America for London and the dependencies thereof, do hereby make known and certify to all whom it may concern, that the Right Honorable John Cowan, before whom the foregoing affidavit was made, as appears by his signature thereto, is lord mayor and chief magistrate of the city of London aforesaid, and that to all acts by him so done full faith and credit are and ought to be given in judicature thereout.

In testimony whereof, I have hereunto set my hand and affixed the seal of the consulate of the United States, in London aforesaid, this seventeenth day of March, in the year of our Lord one thousand eight hundred and thirty-eight, and in the sixty-second year of the independence of the said United States.

[L. S.]

THOS. ASPINWALL.

On this twelfth day of February, one thousand eight hundred and forty, before the subscriber, lord mayor of the city of London, in Great Britain, personally appeared the within-named Thomas Robinson Williams, and made solemn oath that he verily believes himself to be the original and first discoverer of the within-described invention of ; that he does not know or believe that the same
314 has ever before been used or known; and that he is a citizen of the United States of America.

THOS. R. WILLIAMS.

Sworn at the Mansion House, in the city of London, this twelfth day of February, 1840, before me.

C. MARSHAL, *Mayor.*

LONDON, *May 15th*, 1839.

DEAR SIR: I have this day transmitted to Bristol for shipment, by the Great Western steamship, a box directed to yourself and to the care of the collector of the port of New York, containing the various models elucidating the drawings and descriptions in my specification, etc., deposited in your Patent Office on the 8th of May, last year, for a "new combination of fibrous materials," etc.

I herein also inclose the amount of fees. Instead of inclosing the fees as mentioned before, I now send them through Messrs. Newton & Berry, who are also remitting to you for other purposes by the same conveyance; and have to request your kind attention to the *im-*

mediate issuing of the patent, and that you will also have the goodness to forward it, without loss of time, to Messrs. Newton & Berry, 66 Chancery Lane, London.

I have also further to inform you that an attempt has been made, and I believe it was making surreptitiously, to deprive me of this patent, (and some further improvements thereon, which I also intend very soon to patent,) I am sorry to say, by some countrymen of ours, by forestalling me in time.

My machinery and improvements are well known to my friends, Messrs. Newton & Berry, as well as many others here; and any proper precautions, conformable to the law, which can be adopted to prevent an unjust appropriation of inventions, I am sure will not be lost sight of by you.

I have the honor to be yours, truly,

THOS. R. WILLIAMS.

—— ELLSWORTH, Esq.,
Commissioner of Patents, U. S. America.

315 It may be well to mention that the drawings, specification, and all the necessary papers were sent to Mr. D. Saunders, of Washington city, at the request of J. R. Coates, esq., of Philadelphia; and by a letter from Mr. S., dated there on the 31st of July, 1838, to Mr. Coates, I find they were delivered as on the other side of 8th May, 1838.

The party I refer to as having made the attempt to forestall me, is Henry Augustus Wells, of New York, who, I now know, is engaged in making models of *my own machinery;* and from what I learn they are to be sent out to George Sullivan, who has recently left this country for America.

MAY 16TH.

OFFICE FOR PATENTS,
66 *Chancery Lane, May 16th,* 1839.

DEAR SIR: You, I am sure, will excuse Mr. Williams (whom I have known many years) troubling you with this epistle; but as his case really demands your kind consideration, I hope he may not be refused his patent for that of a *direct pirate.* Mr. W. has another machine for "planking" or making hat-bodies, which is *is* not in the papers referred to, but which is intented to patent in America as it is here, but as the case now stands must be a separate patent for Mr. Williams, the papers of which will follow. I have directed the fees to be paid to the proper office.

I remain, with much respect, your obedient servant,

JN. BERRY.

H. L. ELLSWORTH, Esq.

PATENT OFFICE, *Dec. 21st,* 1839.

SIR: The specification of your alleged improvements in the method of combining adhesive composition for paper, etc., etc., is herewith returned to you for amendment.

316 You have omitted to specify what you claim as your invention, in conformity with the provision of law, and until this has been done, the office cannot decide upon the merits of your invention.

Respectfully, yours, etc.,

H. L. ELLSWORTH,
Commissioner.

Mr. THOMAS R. WILLIAMS,
Care of Dr. T. P. Jones, Agent, Washington, D. C.

PATENT OFFICE, *March 24th*, 1840.

SIR: The specification and drawings of your improved machinery for combining fibrous substances are herewith returned for amendment. Your application covers two distinct inventions, namely, the machinery for forming the hat and saturating the same with adhesive compounds, and the machinery for forming hat-bodies, etc., which cannot be admitted in one application. The first of these, as covered by the first section of your claim, appears to be new; and if you limit your application to it, a patent will be granted, unless some information, not now known to the office, should be obtained to prevent it. The machinery covered by the second section of your claim does not, so far as it has been examined, appear to be new; but upon this subject no definite information can be given at present, as a full examination has not yet been made. Should you conclude to limit your claim to the machinery covered by the first section of your claim, the description and representation of the other should be stricken out of the specification and drawings.

Respectfully, yours, etc.,

H. L. ELLSWORTH,
Commissioner.

Mr. T. R. WILLIAMS,
Care of Dr. T. P. Jones, Agent, Washington, D. C.

Thomas Robinson Williams, a citizen of the United States, residing at No. 14 Lamb's Buildings, Bunhill Row, town of London.

317 County of
Kingdom of England.
Method of combining adhesive compositions, such as cotton, silk, flax, etc., as substitute for paper, pasteboard, millboard, papier maché, etc.
Received May 10th, 1838.
Petition signed.
Affidavit complete.
Specification attested.
Two drawings received.
Model received Oct. 9, 1839.
Treasurer's certificate, $30, Dec. 13, 1839.
Examined Chas. M. Keller, March 28, 1840.
Issue

Patented 183
Recorded vol. , page
See letter of May 16th, within.

1559.

Thomas R. Williams, citizen of the United States.
City of London.
County of
England.
Manufacture of stuffs with fibres and adhesive mixtures.
Received May 10th, 1838.
Petition received.
Affidavit "
Specification "
Drawing "
Model received Oct. 9, 1839.
Treasurer's certificate received.
Examined Chas. M. Keller, March 28, 1840.
Issue, J. W. Hand, March 30, 1840.
Patented April 24, 1840
Recorded vol. 10, page 405.

319 Counsel for defendants gives in evidence certified copies of the files and records of the Patent Office of all papers found on file and record, with the exception of the two patents as reissued in the application of Charles St. John, Henry A. Burr, and A. H. Wright, and James M. Riblet, for two reissues of letters patent, granted September 30th, 1856, marked Exhibit No. 7, consisting of file wrapper of reissue No. 396; petition and original specification; Commissioner of Patents' letter, September 9th, 1856; amendment, September 15th, 1856; file wrapper of reissue No. 400, application for reissue No. 400 petition of Charles St. John and others.

The counsel for the complainant objects to the admission in evidence of the certified copies of the files and records offered by the defendants' counsel, marked Exhibit 7, and to each of the same, upon the ground that such copies are not competent evidence, and not admissible as such; and that the copies are not sufficiently authenticated; and that there is no law authorizing the admission of such copies and documents, either with or without the certificate of the Commissioner of Patents.

Counsel for defendants gives in evidence a certified copy of the record of application and correspondence on reissue of letters patent to H. A. Burr, assignee of H. A. Wells, dated December 4th, 1860; machine patent, marked exhibit 8, consisting of petition and specification for reissue of machine patent No. 1087; Keller's letter to Commissioner, October 9th, 1860; do., November 10th, 1860; Burr to Commissioner; Commissioner to Burr, November 5th, 1860; amendments to Burr, November 10th, 1860; certificate of revision No. 238, and file wrapper.

The counsel for complainant objects to the introduction of the record, and each part of the same, offered by the defendants' counsel, and marked Exhibit 8, upon the ground that the same is not compe-

tent evidence, and that none of the parts constituting the record are admissible as evidence; also, that the same is not sufficiently authenticated; and that there is no law authorizing the admission in evidence on a certificate of the Commissioner of Patents, with the seal of the Patent Office.

319 EXHIBIT No. 6.

The United States Patent Office, to all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the files of this office of a caveat filed by H. A. Wells, on the ninth day of October, eighteen hundred and forty-four. In testimony whereof, I, S. T. Shugert, acting Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this third day of September, in the year of our Lord one thousand eight hundred and fifty-seven, and of the independence of the United States the eighty-second.

[L. S.] S. T. SHUGERT.

To the Commissioner of Patents:

The petition of Henry A. Wells, of the city and State of New York, respectfully represents:

That he has made certain improvements in the mode of manufacturing hats, and that he is now engaged in making experiments for the purpose of perfecting the same preparatory to his applying for letters patent therefor. He therefore prays that the subjoined description of his invention may be filed as a caveat in the confidential archives of the Patent Office, agreeably to the provisions of the act of Congress in that case made and provided, he having paid twenty dollars into the treasury of the United States, and otherwise complied with the requirements of the law.

H. A. WELLS.

NEW YORK, *October 5th*, 1844.

Specification by Henry A. Wells of his improvement in the manufacture of hats.

The manufacture of hat-bodies out of wool, or other material, as the foundation of fur nap, has been variously done by hand and by machinery.

320 But as yet no machine has been devised to make the hat-body and the fur nap together by one operation at the same time, and it is to effect this object that this applicant has devised this improvement hereinafter described; and this applicant, in compliance with the requirement of the law, describes, in the first place, the construction and operation of the machinery which comprises his improvement.

The material of fur being cleansed and opened, so that it may be spread equally upon an endless cloth, is ready for operation.

Upon a frame, represented in elevation by figure 1, and in plan view by figure 2, there is an endless cloth running over rollers upon and by which the fur material may be conveyed to a brush revolving with great rapidity against the point of delivery, which point of delivery is formed by a covered roller acting closely upon the roller carrying the endless cloth at the delivery end thereof, which roller, with another, may or not carry an endless cloth. The brush revolving, say three thousand times a minute, throws the fur into a conduit, whose sides and bottom, diverging from said point of delivery to the width and height of a cone-frame of about two and a half feet, more or less, in height, and sixteen inches diameter at its base, conveys the buoyant fur by suction towards and upon the cone-frame, which is constructed with a spherical apex, the cone-frame being made of zinc sheets, perforated closely with small holes, and standing upon a box from which the air is exhausted by the action of a fan revolving within a box or case, connected by a conduit therewith. The cone standing upon a revolving base, carried by convenient mechanism, so that as the cone revolves, the buoyant fur applies itself by force of suction through the holes in the conical frame to each and every part of it; and to further this purpose, a movable bonnet is applied to the upper part of the diverging conduit of the flying fur, so that this may be directed to the upper part of the cone, or its spherical portion, until fur or substance sufficient be deposited thereon, and after a full supply, which artists skilled in the manufacture of hat-bodies will readily judge of, has been conducted to the conical part, the lower part of the diverging conduit being a broad inclined plane, so as to throw the requisite greater quantity to form the brim of the hat-body,
321 and the supply of fur continued during fourteen to fifteen revolutions of the cone-frame, the operation of forming the hat body, and fixing the fur for the nap at the same time at one operation, will be accomplished. Then the cone-frame with its hat-body thus formed being closely covered with woolen cloths taken from boiling water, and by a zinc conical case over all with large perforations, and secured thereon by vertical hinges on one side and a vertical rod through rings on the other, the whole, that is, the cone-frame with the hat-body thereon, covered with hot cloths, and enveloped in the zinc case, are immersed in a vessel of boiling hot water for two minutes, being turned over or not in mean time, and then being placed in the open air, the case and cloths taken off; the cone is inverted, and the hat-body dropped off from the frame so inverted, and is then in effect ready to be planked and for all further operations by hand or machinery, till it be of requisite thickness or size for shaping, dyeing, or finishing.

The exterior surface being capable of raising a nap of any requisite and convenient length, which is the main object of this improvement.

The advantage of this fabric, and this mode of manufacturing it, are quite plain to the understanding of men experienced in the art of manufacturing hats.

There are other materials commonly used in making the nap of hats, which by being mixed with materials proper only for hat-bodies, may be formed by this means into hat-bodies ready to be napped, or have the nap raised out of it as aforesaid; and this applicant extends

his claim to cover the manufacture by the machinery aforesaid of all such materials commingled together into hat-bodies ready to be napped as aforesaid. In said machinery there are two cone-frames on one cone-box, and this box is made to revolve horizontally upon its center, so as to present each cone-frame in succession to the conduit of the fur, by which time may be saved in the operation.

There is a primary feeder to break the fur when matted together.

H. A. WELLS.

Witnesses:

GEORGE SULLIVAN.
MORTON FAIRCHILD.

322 STATE OF NEW YORK,
City and County of New York:

On this seventh day of October, A. D. 1844, before the subscriber, a commissioner of deeds, duly authorized to administer oaths, personally appeared the within-named Henry A. Wells, and made solemn oath that he verily believes himself to be the original and first inventor of the mode herein described for manufacturing hats, and that he does not know nor believe that the same was ever before known or used, and that he is a citizen of the United States.

B. A. CAMPBELL,
Com. of Deeds and to take Affidavits, etc.

H. A. WELLS.

References to the drawing annexed, referred to in the specification of Henry A. Wells, of New York, which references apply to all the figures, so far as they are expressed thereon respectively:

a, frame.
r, rollers carrying an endless feeding-cloth.
f, feeding-cloth.
b, brush revolving against the point of delivery.
c r, covered roller resting upon the lower roller, *r*.
B F, conduit of the buoyant fur or other material.
S, sides of top of this conduit.
B, bottom of this conduit.
D, bonnet of this conduit.
C F, cone-frame, perforated.
c f b, cone-frame base resting on a wheel.
C S, cone-shaft.
S W, spun or driving-wheel to drive the cone base-wheel.
C B W, cone base-wheel.
C B, cone-box.
C A, conduit of air from cone-box to fan-box.
F B, fan-box and fan, F.
S *p* C, side passages from conduit of air to fan-box.
O A, outlet of air.
P F, pulley to fan.
P C S, pulley to cone-shafts.
P B, pulley to revolving brush.

P E C, pulley to endless cloth-roller.
C E C, cover to endless cloth, perforated.

323 EXHIBIT No. 7.

The United States Patent Office to all persons to whom these presents shall come, greeting:

This is to certify that the annexed are true copies from the files and records of this office of all papers found on file and record, with the exception of the two patents, as reissued, in the application of Charles St. John, Henry A. Burr, A. H. Wright, and James M. Riblet, for a reissue of letters patent issued to Henry A. Wells on the twenty-fifth day of April, eighteen hundred and forty-six, which application, at the request of the Commissioner of Patents, was divided, and two reissues granted on the thirtieth day of September, eighteen hundred and fifty-six, and on the seventh day of October, eighteen hundred and fifty-six, respectively—the copies of the specifications, showing the erasures, interlineations, and marginal writing, as they appear in the originals.

In testimony whereof, I, Joseph Holt, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this nineteenth day of October, in the year of our Lord one thousand eight hundred and fifty-seven, and of the independence of the United States the eighty-second.

J. HOLT.

Reissue. No. 396. *Baldwin.*

Charles St. John, H. A. Burr, A. H. Wright, and James M. Riblet, assignees of Henry A. Wells, deceased, of New York, county of New York, State of New York.

HAT-BODIES.

Received, September 4th, 1856.
Petition, " " "
Affidavit, " " "
Specification, " " "
2 drawings, " " "
Model old pat., " " "
1 cert. dep., $15, Sept. 4th, 1856.
Cash.
324 Examined, Baldwin, Sept. 18th, 1856.
2 issue, Shugert, Sept. 19th, 1856.
Patented, April 25th, 1846.
Reissued, Sept. 30th, 1856.
Recorded vol. 4, page 220.
H.

A. P. BROWNE,
New York.

To the Commissioner of Patents:

The petition of Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, all of the city, county, and State of New York, respectfully represents:

That letters patent of the United States, bearing date the 25th day of April, 1846, were granted to Henry A. Wells, a citizen of the United States, and then residing in the city, county, and State of New York, for improvements in the process of, and machinery for, making hat-bodies of fur, which said letters patent, and all the right, title, and interest in and to the same, have passed by assignment, and are now vested in your petitioners.

That the said Henry A. Wells is now deceased, and after the transfer and assignment of the said letters patent to your petitioners, and after the decease of the said Henry A. Wells, your petitioners were advised by counsel learned in the law that the said letters patent are inoperative to secure the said invention described in the said letters patent, by reason of a defective and insufficient specification, which information your petitioners verily believe to be true, which said defects have arisen from inadvertence and mistake, and without any deceptive or fraudulent intention. Your petitioners, therefore, pray that they may be allowed to surrender the said letters patent, and they hereby do surrender the same, and pray that new letters patent may issue to them, as the assignees of the whole right, title, and interest, for the same invention, for the residue of the period for which the original letters patent were granted, in accordance with the amended
specification herewith presented and herewith attached, and by
325 them signed, they having paid fifteen dollars into the treasury of
the United States, agreeably to the requirements of the act of Congress in that case made and provided.

And your petitioners hereby authorize Alexander P. Browne (in connection with Charles M. Keller as counsel) to act as their true and lawful attorney in presenting this application, altering, amending, or withdrawing the same, as the case may require, and to receive the patent when granted.

CHARLES ST. JOHN.
H. A. BURR.
A. H. WRIGHT.
JAMES. M. RIBLET.

STATE OF NEW YORK,
City and County of New York:

On this second day of September, A. D. 1856, before me personally came Charles St. John, H. A. Burr, A. H. Wright, and James M. Riblet, and being severally duly sworn, each for himself, did depose and make oath that the foregoing petition, by him subscribed, contains the truth, the whole truth, and nothing but the truth.

LOUIS. N. GLOVER,
Com. of Deeds.

Application for reissue No. 396

To all whom it may concern:

Be it known that Henry A. Wells, late of the city, county, and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in the process of, and machinery for, making hat-bodies of fur, for which said improvements letters patent of the United States were granted to the said Wells, bearing date the 25th day of April, 1846, of which the following is a full, clear, and exact description of the principle or character which distinguishes the said invention from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this description, in which figure 1 is a plan of the machine; figure 2, a longitudinal vertical section; and figure 3, a longitudinal elevation. The
326 other figures will be described in their appropriate places. The same letters indicate like parts in all the figures.*

[It has long since been suggested and described that hat-bodies might be made of fur by knocking the fibres from the doffer of a carding-machine by a rotating beater, to suspend them in the atmosphere over a perforated cone, or other form, and drawing such fibres on to the surface of such cone, or other form, by exhausting the air from the inside, thereby inducing currents of the surrounding air in which the fibres are suspended, to travel towards and through the perforations, and thereby deposit and hold such fibres of fur on the outer surface of such perforated cone, or other form, with the view to form a bat to be afterwards felted into a hat-body. But such suggested or described plan never did, and never can, answer a practical purpose for making hat-bodies, for several reasons. Fur cannot be successfully worked in what is known as a carding-machine, on account of being too light to be properly acted upon by the carding operation.]†

Hat-bodies are required to be made thick at and near the rim, and thin along the crown and tip, that the required strength may be given where it is required, without making the hat too heavy, and at too great a cost of material. This disposition of the fur can be obtained by the skill and judgment of the workman by the hand process, known under the name of "bowing," but cannot by the plan above referred to, for the reason that the fibres are only controlled by the currents induced through the apertures of the cone, or other form, by the exhaust, instead of being thrown and properly directed for distribution on to the cone, or other form. When the fibres are not properly thrown and directed, but are drawn to the surface by the action of the exhaust, the force thus induced gradually decreases as the apertures in the cone are closed up by the accumulation of the fur deposited on the outer surface thereof, and in consequence the impelling force, which carries the fibres, becomes insufficient to control the force of gravity which will then prevail, and cause the fibres to accumulate to

*Insert A. See amendment, filed Sept. 16, 1856. Page 112.
†Erased. See amendmant, filed Sept. 16, 1856. See p. 111.

328 a greater thickness on the tip of the cone, where much less is required than below. And the said suggested plan cannot produce a practical result for the further reason that there is no mode described by which the bat of fur fibres can be hardened while on the cone, that it may be removed from such cone preparatory to the after and well-known process of sizing or felting.

The invention of the said Henry A. Wells, by which the required and much-desired practical result was obtained, consists in forming the bat of fur fibres by throwing the fur, in properly regulated quantities, against a section of the circumference of a perforated cone, or other form, as the same is rotated to present, in succession, every part of the circumference thereof to the current of impelled fur, and thereby obtain the required thickness of bat, when this is combined with the holding of the fibres on to the cone, during the operation, by the pressure of the surrounding atmosphere, induced by exhausting the air from within the said perforated cone, or other form.

[And the said invention of the said Henry A. Wells also consists in combining with the said method of forming the bat of fibres on a perforated cone, or other form, the hardening of such bat while on the cone, or other form, to give it the required consistency to admit of taking it off in a suitable condition for sizing by the well-known process of felting.*]

In the accompanying drawing, *a* is a frame properly adapted to the operative parts of the machine, and *b* the lower feed-apron, on which the stock is spread by the attendants in separate parcels, each sufficient for the formation of a hat according to its intended weight. This apron, or endless belt of cloth, or other suitable material, passes around a roller, *c*, and a lip, *d*, the former at the back of the machine, with its bearings in sliding-boxes, governed by set screws, *e*, *e*, for the purpose of tightening the apron, and the latter near to the rotating brush *f*, and so formed as to present a slightly rounded edge for the apron to pass over, where it presents the fur to the ac-
328 tion of the brush. Instead of this slightly-rounded edge, a small metallic roller may be substituted; but when this is done, the roller should be supported at different points between its end journals; and this, when effected, by letting it run in a circular groove in the lip, as represented in section at figure 4, where *g* indicates this roller. The fur, as it is carried along towards the lip *d*, is gradually compressed by the upper apron b^1, which passes around a feed-roller c^1 and lip d^1, in manner similar to the under feed-apron. The roller c^1 runs in a frame, *i*, (of which the lip d^1 forms part,) hung on journals that rest in standards, *j*, so that the lip d^1 can be made to pass on to the fur, between it and the under lip *d*, and thus gripe the fibres, and present them to the effective action of the brush *f*. The under plane of the upper apron, b^1, is inclined to the upper plane of the lower one *b*, the more effectually to present the fibres in the proper manner to the brush.

The roller c^1 of the upper apron runs in sliding-boxes, governed by set screws, e^1, e^1, and is placed forward of the journals of the

* Erased. See amendment, Sept. 16, 1856. See p. 111.

frame, so that the tension of the belt i^2, which communicates motion from the lower roller c to the upper one c^1, may press the upper lip d^1 on the under lip d; but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure under similar circumstances.

The fibres, as they pass from the feed-aprons, are acted upon by a brush, f, that rotates with great velocity, and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed, if desired. As the fibres are first presented, they are brushed and properly laid by the downward action of the brush, as indicated by the arrow, and when liberated, are carried down the curved surface l of a chamber or tunnel m, and at the lower edge of this they meet a current of air, (that enters a narrow aperture n, near the bottom of the chamber, and extending the whole length of the brush,) which, being induced by the rotation of the brush and the partial vacuum in a perforated cone, prevents the fibres of fur from falling and resting on the bottom of the chamber, and carries them on to the perforated cone o. This chamber extends over and under the brush, and the forward
329 part of the lips, and turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush; its bottom rests on a set screw p, to regulate the delivery end of the chamber relatively to the cone; its forward end, in addition to this, is provided with a hinged flap q, regulated by a cam lever, as a means of regulating the delivery of the fibres—its top r is gradually elevated, and sides contracted, to make the delivery-aperture nearly of the form of the cone, but narrower and higher; and its upper part is provided with a hood s, so curved as to correspond generally with the curve of the tip of the cone. This hood is hinged to the upper part of the delivery-aperture of the chamber, and is connected with an eccentric, t, by means of a cord, u, and bell-crank u^1, that passes over a pulley, r^{11}, so that each revolution of this eccentric carries the hood up and down to direct the discharge, and distribute the fibres on to the cone, a greater thickness being desirable in the parts of the bat which form the brim, than on the tip and crown; and when it is desired still further to diversify the distribution of the fibres, a cam can be substituted for the eccentric, and the connection between it and the hood is formed, as represented in section at figure 5, where the cam t acts on a lever, t^1, connected with the hood s by the cord u.

The cone o is made in the usual manner, but of thin sheet metal, perforated, instead of wire gause; its lower edge fits in a metallic ring, w, that runs in an appropriate collar in the upper part of a case, x, and its outer periphery is provided with cogs that mash into the cogs of a pinion, y, (concealed in the drawing by the pulley, d^2,) on a vertical shaft, z, by which a slow rotary motion is given to the cone, as the fibres are thrown on to it, to distribute them equally all around the cone. The case x is sufficiently long to receive two rings, w, one on each side of the pinion, y, by which both are kept in motion, and it (the case) is made to swivel on a hollow collar, f^2, to which it bottom is fitted, so that when one cone is covered, it may be turned

aside by turning the case half a revolution, and another cone put on to the other ring, that another bat may be in the process of forming whilst the one already formed may be prepared for the hardening process, in the manner to be hereafter described.

330 The case x communicates through the hollow collar f^1 with an exhausting fan-blower, g^1, which consists of a vertical arbor, h^1, with oblique vanes, i^1, so that when rotating with great velocity in the direction of the arrow the air is exhausted from the case x and the perforated cone o. When one of the cones is removed from one of the rings, w, to be taken to the hardening apparatus, the aperture in the ring w must be closed up with the cap-plate, w^2, to prevent the access of air Any other mode of exhausting the case and cone may be employed, but this is the most efficient which he (Wells) essayed.

The preparation of the formed bat for hardening is effected by covering it with pieces of felt or fulled cloth just taken from hot water, and this is done in the following manner, namely: The attendant takes from a kettle of hot water a piece of felt cloth, rolled up on a roller, and applies one end of it to the surface of the bat, and, as the cone rotates, the felt cloth winds from the roller on to the bat on the cone; another piece of felt cloth is put on the top, and then a strong perforated metallic cone, k^1, (see figure 6,) is put over the whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them whilst it is immersed in hot water to harden. As the perforated cone o is better when made very thin, the pressure of the water, when drawing it out of the kettle, after the bat has been hardened, tends to and would collapse it, and therefore, to prevent this, another perforated metallic cone, l^1, (see figure 7,) is put inside, before the whole is immersed in hot water, to sustain the pressure in drawing the whole out of the hardening kettle. The relative situation of the three cones, the bat, and the covering felt cloth, preparatory to the hardening process, is represented on an enlarged scale at figure 8, which is a vertical section through the whole. The inner sustaining cone may be dispensed with, if desired, by making the cone o of greater thickness and strength.

All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying drawings, in which m^1 is a main line shaft overhead, driven by any first mover. From a wheel n^1 on it, a band o^1 extends to a pulley p^1 on the shaft of the brush, which should make about two thousand

331 revolutions per minute, more or less. From another wheel q^1 on this same shaft, a band r^1 extends to a pulley s^1, on the shaft of which there is a wheel t^1, that drives the exhaust-fan g^1 by the belt u^{11}. And from a pulley v^1, on the same line shaft, a belt extends to a wheel w^1, on the shaft of which there is a pulley x^1, from which extends another belt y^1 to a wheel z^1 on the shaft a^2, (that carries the eccentric t,) to give all the reduced motions required for the other parts of the machinery. From a wheel b^2 on this shaft, a belt c^2 extends to a pulley d^2 on the shaft z that rotates the cone o, and another pulley e^2 drives the wheel f^2 of the feed-roller c by the belt g^2, and on the other end of the axle of this feed-roller there is a pulley h^2, which drives, by a cross-belt i^2, the upper feed-roller c^1. If desired,

an alarm can be connected with the feed-roller of the lower apron, to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arber of the feed-roller c, of the lower feed-apron, by a belt with a wheel k^2, provided with a cam or pin, to lift at every revolution the hammer l^2, of the bell m^2, the striking of which shall give requisite indication.

It will be obvious from the foregoing that the hood may be operated by hand instead of machinery, thus substituting the attention, skill, and cost of an operative, for the positive regularity and cheapness of mechanical movements. It may be well to add, as a mere matter of precaution, that this invention is not limited to the making of hat-bodies, but to the making of bats on formers of any other shape or configuration, the form of the delivery aperture of the chamber, and the hood, and the movements of the latter being properly adapted to the change of form of the perforated mould or former, with the restrictions indicated.

Having thus described the mode of application of the said invention of the said Henry A. Wells, as the same was successfully reduced to practice by him, we do not wish to be understood as limiting the claim of invention to such mode of application, as other modes may be devised, operating on the same principle, or having the same mode of operation, and only differing therefrom in the substitution of equivalent means.

What is claimed herein as the invention of the said Henry A.
332 Wells, deceased, is forming bats of fur fibres by throwing the fur, in properly regulated quantities, substantially as herein described, against a section of the circumference of a perforated cone, or other form, as the same is rotated to present in succession every part of the circumference thereof to the current of impelled fur, to obtain the required thickness of bat, substantially as described, in combination with the method of holding the fibres on to the cone, or other form, during the operation, substantially as described, and for the purpose specified.

[And what is further claimed as the invention of the said Henry A. Wells, deceased, is combining with the said method of forming the bat, substantially as specified, on a perforated cone, or other form, the hardening of such bat while on the perforated cone, or other form, to give it the required consistency to admit of taking it off in a suitable condition for sizing by the well-known, or other process of felting.*]

CHARLES ST. JOHN.
H. A. BURR.
A. H. WRIGHT.
JAMES M. RIBLET.

Witnesses:
WM. H. BISHOP.
CHARLES A. WILSON.

*Erased. See amendment, filed September 16th, 1856. See p. 111.

STATE OF NEW YORK,
City and County of New York, ss:

On this second day of September, A. D. 1856, before me personally came Charles St. John, H. A. Burr, A. H. Wright, and James M. Riblet, and being severally duly sworn, each for himself, did depose and say that the contents of the foregoing specification by him subscribed are true.

LOUIS N. GLOVER,
Com. of Deeds.

Hon. Com. of Patents:

SIR: I inclose herewith the specification, duplicate drawings, and certificate for the fee of fifteen dollars, in the matter of the application of Charles St. John and others, for the *reissue* of letters
333 patent granted on the 25th of April, 1846, to H. A. Wells, late of New York city, (now deceased,) for improvements in the process of, and machinery for, making hat-bodies of fur.

The old patent is also inclosed herewith, together with an affidavit of H. A Burr, (one of the petitioners for the reissue,) of the loss of the drawings which we attached to the patent.

I remain, sir, yours, respectfully,

ALEX. P. BROWNE,
By WM. H. BISHOP.

NEW YORK, *Sept. 3d*, 1856.

Received and filed Sept. 4, 1856.

F. L. W.

Specification for the reissue of patent granted to H. A. Wells, now deceased, on the 25th of April, 1846, for making hat-bodies.

In the matter of the petition of Charles St John, Henry A. Burr, Albert H. Wright, and James M. Riblet, for the reissue of the letters patent granted on the 25th day of April, 1846, to Henry A. Wells, new deceased, for improvements in the process of, and machinery for, making hat-bodies of fur.

I, Henry A Burr, of the city, county, and State of New York, being duly sworn, do depose and say that I am jointly, with the persons above named, the sole owners of the said letters patent; that the said letters patent have been for some years in my possession. That at a term of the circuit court of the United States for the district of New Jersey, held at Trenton, in said State, some years ago, the drawings attached to the said letters patent were detached therefrom by the judge of said court, and have been lost, mislaid, or missing since the time last referred to. That I have caused diligent search to be made for said drawings, and that the same cannot be found. And further this deponent saith not.

H. A. BURR.

Sworn before me this 2d day of Sept., 1856.

JOHN F. GRAY,
Com. of Deeds.

334 U. S. PATENT OFFICE, *Sept.* 9, 1856.

GENTS.: In your application for a reissue of the patent granted to Henry A. Wells on the 25th August, 1846, the specification is herewith returned for a division. The machinery for forming, and the method of hardening, present substantive inventions, and cannot properly be admitted in one application under the rules of the office. To save time, the office will now present its objections to granting the first clause of the claim in the application.

1st. The patent recites a condition of the art that involves a substantial anticipation of this clause of the claim.

2d. The original specification, dated October 8th, 1845, expressly disclaims the whole machine, while the first clause virtually embraces the whole machine.

3d. From these facts it is proper to presume that the inventor claimed as broadly as his knowledge of the existing state of the art would justify him in doing; and his claims were accordingly limited to specific devices, as the improvements of his invention.

4th. The invention can only be explained by the assignees, as experts; and even then their explanation must be regarded as that of interested parties.

5th. The recital in the application is new matter, for there is no such limitation as it presents in the recital of the patent.

When you elect the clause of the claim on which you prefer to have the present application examined, the office will pronounce a decision.

Respectfully, yours, etc.,

C. MASON, *Com.*

ST. JOHN, BURR, WRIGHT, and RIBLET,
(Care A. P. Browne, New York.)

Amendment, Sept. 15, 1856.

We hereby amend the specification of our application for the reissue of the letters patent granted to Henry A. Wells, bearing date the 25th day of April, 1846, for improvements in the process of, and machinery for, making hat-bodies of fur, which said application was filed on the 4th day of Sept. inst., by striking out on the first page all after the 17th line, down to the word "hat," in the last line, and substituting in lieu thereof the following, namely:

335 ["It has long been essayed to make hat-bodies by throwing the fibres of fur, wool, etc., by a brush, or picker-cylinder, on to a perforated cone, exhausted by a fan below, to carry and hold the fibres thereon by the currents of air that rush from all directions towards and through the apertures of the cone, and thus form a bat of fibres ready for hardening and felting, but from various causes all these attempts have failed."*]

And we further amend the said specification by striking out from the 7th to the 14th line inclusive on the third page, and also by strik-

* A. Insert at A, page 1.

out the last section of the claim comprised in the last nine lines of the last page.

CHARLES ST. JOHN,
H. A. BURR,
A. H. WRIGHT,
JAMES M. RIBLET,
By their attorney, CHAS. M. KELLER.

WASHINGTON, D. C., *Sept. 15th*, 1856.

Reissue. W. No. 400. *Division.*

Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, assignees of Henry A. Wells, deceased, of New York, county of New York, State of New York.

HAT-BODIES.

Received, September 16th, 1856.
Petition, " " "
Affidavit, " " "
Specification, " " "
2 drawings, " " "
Model old.
Cert. dep.
1 cash $30, Sept. 16th, 1856.
Examined Baldwin, Sept. 19th, 1856.
2 issue, Shugert, Sept. 22, 1856.
4 patented April 25th, 1846.
Reissued Oct. 7th, 1856.
Recorded vol. 4, page 235
H.

A. P. BROWNE, *New York.*

336 *Application for reissue No.* 400.

To all whom it may concern:

Be it known that Henry A. Wells, late of the city, county, and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in the process of, and machinery for, making hat-bodies of fur, for which said improvements letters patent of the United States were granted to the said Wells, bearing date the 25th day of April, 1846, of which the following is a full, clear, and exact description of the principle or character which distinguishes the said invention from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this description, in which figure 1 is a plan of the machine; figure 2, a longitudinal vertical section; and figure 3 a longitudinal elevation. The other figures will be described in their appropriate places. The same letters indicate like parts in all the figures.

[It has long been tried to make hat-bodies by throwing the fibres of

fur, wool, etc., by a brush or picker-cylinder on to a perforated cone, exhausted by a fan below to carry and hold the fibres thereon by the currents of air that rush from all directions towards and through the apertures of the cone, and thus form a bat of fibres ready for hardening and felting; but from various causes all these attempts have failed.*]

Hat-bodies are required to be made thick at and near the rim, and thin along the crown and tip, that the required strength may be given where it is required without making the hat too heavy, and at too great a cost of material. This disposition of the fur can be obtained by the skill and judgment of the workman by the hand process,
337 known under the name of "bowing," but cannot by the plan above referred to, for the reason that the fibres are only controlled by the currents induced through the apertures of the cone, or other form, by the exhaust, instead of being thrown, and properly directed for distribution on to the cone, or other form. When the fibres are not properly thrown and directed, but are drawn to the surface by the action of the exhaust, the force thus induced gradually decreases, as the apertures in the cone are closed up by the accumulation of the fur deposited on the outer surface thereof, and in consequence the impelling force which carries the fibres becomes insufficient to control the force of gravity which will then prevail, and cause the fibres to accumulate to a greater thickness on the tip of the cone, where much less is required than below. And the said suggested plan cannot produce a practical result for the further reason that there is no mode described by which the bat of fur fibres can be hardened while on the cone, that it may be removed from such cone preparatory to the after and well-known process of sizing or felting.

The invention of said Henry A. Wells, by which the required practical result was obtained, consists in forming the bat of fur fibres on a perforated cone, or other form, in the manner substantially as above described, in combination with the hardening of such bat while on such cone or other form, to give it the required consistency to admit of taking it off in a suitable condition for sizing by the well-known process of felting.

In the accompanying drawings, *a* is a frame properly adapted to the operative parts of the machine, and *b* the lower feed-apron on which the stock is spread by the attendant in separate parcels, each sufficient for the formation of a hat according to its intended weight.

This apron, or endless belt of cloth or other suitable material, passes around a roller *c* and a lip *d*, the former at the back of the

* The above is the reading as amended; the original is as follows: "It has long been suggested and described that hat-bodies might be made of fur by knocking the fibres from the doffer of a carding-machine by a rotating beater, to suspend them in the atmosphere over a perforated cone, or other form, and drawing such fibres on to the surface of such cone, or other form, by exhausting the air from the inside, thereby inducing currents of the surrounding air, in which the fibres are suspended to travel towards and through the perforations, and thereby deposit and hold such fibres of fur on the outer surface of such perforated cone, or other form, with the view to form a bat, to be afterwards felted into a hat-body. But such suggested or described plan never did, and never can, answer a practical purpose for making hat-bodies, for several reasons. Fur cannot be successfully worked in what is known as a carding-machine, on account of being too light to be properly acted upon by the carding operation."

machine with its bearings in sliding boxes, governed by set screws *e e*, for the purpose of tightening the apron, and the latter near to the rotating brush *f*, and so formed as to present a slightly rounded edge for the apron to pass over where it presents the fur to the action of the brush. Instead of this slightly rounded edge a small metallic roller may be substituted, but when this is done the roller should
338 be supported at different points between its end journals, and this be effected by letting it run in a circular groove in the lip, as represented in section at figure 4, where *g* indicates this roller. The fur, as it is carried along towards the lip *d*, is gradually compressed by the upper apron b^1, which passes around a feed-roller c^1 and lip d^1, in manner similar to the under feed-apron. The roller c^1 runs in a frame *i* (of which the lip d^1 forms part) hung on journals that rest in standards *j*, so that the lip d^1 can be made to press on to the fur between it and the under lip *d*, and thus gripe the fibres and present them to the effective action of the brush *f*. The under plane of the upper apron b^1 is inclined to the upper plane of the lower one, *b*, the more effectually to present the fibres in the proper manner to the brush.

The roller c^1 of the upper apron runs in sliding boxes, governed by screws e^1 e^1, and is placed forward of the journals of the frame, so that the tension of the belt i^2, which communicates motion from the lower roller *c* to the upper one c^1, may press the upper lip d^1 on the under lip *d*; but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure under similar circumstances.

The fibres, as they pass from the feed-aprons, are acted upon by a brush *f* that rotates with great velocity, and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed, if desired. As the fibres are first presented they are brushed and properly laid by the downward action of the brush, as indicated by the arrow, and when liberated are carried down the curved surface *l* of a chamber or tunnel *m*, and at the lower edge of this they meet a current of air (that enters a narrow aperture *n* near the bottom of the chamber, and extending the whole length of the brush,) which, being induced by the rotation of the brush and the partial vacuum in a perforated cone, prevents the fibres of fur from falling and resting on the bottom of the chamber, and carries them on to the perforated cone *o*. This chamber extends over and under the brush and the forward part of the lips, and turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush; its bottom rests on a set screw *p* to regulate the delivery end of the chamber relatively to the cone; its forward end, in addition to
339 this, is provided with a hinged flap *q* regulated by a cam lever as a means of regulating the delivery of the fibres, its top *r* is gradually elevated and sides contracted to make the delivery aperture nearly of the form of the cone, but narrower and higher, and its upper part is provided with a hood *s* so curved as to correspond generally with the curve of the tip of the cone. This hood is hinged to the upper part of the delivery aperture of the chamber, and is con-

nected with an eccentric t by means of a cord u and bell-crank u^1 that passes over a pulley r^{11}, so that each revolution of this eccentric carries the hood up and down to direct the discharge and distribute the fibres on to the cone, a greater thickness being desirable in the parts of the bat which form the brim than on the tip and crown; and when it is desired still further to diversify the distribution of the fibres, a cam can be substituted for the eccentric, and the connection between it and the hood is formed as represented in section at figure 5, where the cam t acts on a lever t^1, connected with the hood s by the cord u.

The cone o is made in the usual manner, but of thin sheet metal perforated, instead of wire gauze; its lower edge fits in a metallic ring w, that runs in an appropriate collar in the upper part of a case x, and its outer periphery is provided with cogs, that mash into the cogs of a pinion y, (concealed in the drawing by the pulley d^2,) on a vertical shaft z, by which a slow rotary motion is given to the cone, as the fibres are thrown on to it, to distribute them equally all around the cone. The case x is sufficiently long to receive two rings, w, one on each side of the pinion y, by which both are kept in motion, and it (the case) is made to swivel on a hollow collar f^1, to which its bottom is fitted, so that when one cone is covered it may be turned aside by turning the case half a revolution, and another cone put on to the other ring, that another bat may be in the process of forming, whilst the one already formed may be prepared for the hardening process in the manner to be hereafter described.

The case x communicates through the hollow collar f^1 with an exhausting fan-blower g^1, which consists of a vertical arbor h^1 with oblique vanes i^1, so that when rotating with great velocity in the direction of the arrow, the air is exhausted from the case x and
340 the perforated cone o. When one of the cones is removed from one of the rings w to be taken to the hardening apparatus, the aperture in the ring w must be closed up with a cap-plate w^2 to prevent the access of air. Any other mode of exhausting the case and cone may be employed, but this is the most efficient which he (Wells) essayed.

The preparation of the formed bat for hardening is effected by covering it with pieces of felt or fulled cloth, just taken from hot water, and this is done in the following manner, namely: The attendant takes from a kettle of hot water a piece of felt cloth, rolled upon a roller, and applies one end of it to the surface of the bat, and as the cone rotates the felt cloth winds from the roller on to the bat on the cone; another piece of felt cloth is put on the top, and then a strong perforated metallic cone k^1 (see figure 6) is put over the whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them whilst it is immersed in hot water to harden. As the perforated cone o is better when made very thin, the pressure of the water when drawing it out of the kettle, after the bat has been hardened, tends to and would collapse it, and therefore, to prevent this, another perforated metallic cone l^1 (see figure 7) is put inside (before the whole is immersed in hot water) to sustain the pressure in drawing the whole out of the hardening-kettle. The relative situation of the three cones, the bat, and the covering felt cloth, prepara-

tory to the hardening process, is represented on an enlarged scale at figure 8, which is a vertical section through the whole. The inner sustaining cone may be dispensed with, if desired, by making the cone *o* of greater thickness and strength.

All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying drawings, in which m^1 is a main line shaft, overhead, driven by any first mover. From a wheel n^1 on it, a band o^1 extends to a pulley p^1 on the shaft of the brush, which should make about two thousand revolutions per minute, more or less. From another wheel q^1 on this same shaft, a band r^1 extends to a pulley s^1 on the shaft of which there is a wheel t^1 that drives the exhaust-fan g^1 by the belt u^{11}. And from a pulley v^1 on the same line shaft, a belt extends to a wheel w^1, on the shaft of which there is a pulley x^1, from which extends
341 another belt y^1 to wheel z^1 on the shaft a^2, (that carries the eccentric t,) to give all the reduced motions required for the other parts of the machinery. From a wheel b^2 on this shaft, a belt c^2 extends to a pulley d^2 on the shaft z, that rotates the cone o, and another pulley e^2 drives the wheel f^2 of the feed-roller c by the belt g^2, and on the end of the axle of this feed-roller there is a pulley h^2, which drives, by a cross-belt i^2, the upper feed-roller c^1. If desired, an alarm can be connected with the feed-roller of the lower apron, to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arber of the feed-roller c of the lower feed-apron, by a belt with a wheel k^2, provided with a cam or pin, to lift at every revolution the hammer l^2 of a bell m^2, the striking of which shall give requisite indication.

It will be obvious from the foregoing that the hood may be operated by hand instead of machinery, thus substituting the attention, skill, and cost of an operative for the positive regularity and cheapness of mechanical movements. It may be well to add, as a mere matter of precaution, that this invention is not limited to the making of hat-bodies, but to the making of bats on formers of any other shape or configuration, the form of the delivery aperture of the chamber, and the hood, and the movements of the latter being properly adapted to the change of form of the perforated mold or former, with the restrictions indicated.

Having thus described the mode of application of the said invention of the said Henry A. Wells, as the same was successfully reduced to practice by him, we do not wish to be understood as limiting the claim of invention to such mode of application, as other modes may be devised, operating on the same principle, or having the same mode of operation, and only differing therefrom in the substitution of equivalent means.

What we claim as the invention of the said Henry A. Wells, deceased, in the process of making fur hat-bodies, is the forming of the bat of fur fibres on a perforated cone, or other form, in manner substantially as described, in combination with the hardening of
342 such bat, while on such cone, or other form, to give it the required consistency to admit of taking it off in a suitable condi-

tion for sizing by the well-known process of felting, substantially as described.

CHARLES ST. JOHN.
H. A. BURR.
A. H WRIGHT.
JAS. M. RIBLET.

Witneses:
WM H. BISHOP.
ALEX. PORTER BROWNE.

To the Commissioner of Patents:

The petition of Charles St. John, Henry A. Burr, Albert H. Wright, and James M. Riblet, all of the city, county, and State of New York, respectfully represents:

That letters patent of the United States, bearing date the 25th day of April, 1846, were granted to Henry A. Wells, a citizen of the United States, and then residing in the city, county, and State of New York, for improvements in the process of, and machinery for, making hat-bodies of fur, which said letters patent, and all the right, title, and interest in and to the same has passed by assignment, and is now vested in your petitioners.

That the said Henry A. Wells is now deceased, and after the transfer and assignment of the said letters patent to your petitioners, and after the decease of the said Henry A. Wells, your petitioners were advised by counsel learned in the law that the said letters patent are inoperative to secure the said invention described in the said letters patent, by reason of a defective and insufficient specification; which information your petitioners verily believe to be true; which said defects have arisen from inadvertence and mistake, and without any deception or fraudulent intention.

That thereupon your petitioners did, on the 2d day of September instant, pray permission to surrender the said letters patent, and the reissue thereof for the unexpired term of the said original letters patent, on an amended specification, which was filed by them
343 in the Patent Office of the United States on the 4th day of September instant. That on the examination thereof by the duly authorized officers of the department, your petitioners have been officially advised that the said amended specification has been adjudged to cover two substantive inventions, which cannot, under the rules of the department, be covered by one patent.

That upon the judgment of the department so pronounced, your petitioners have restricted their said specification in conformity with such requirement, and they pray that additional letters patent may be granted to your petitioners for the residue of the unexpired time of the said original letters patent, covering the other part of the said invention of the said Henry A. Wells, on an amended specification herewith submitted, in accordance with the provisions of the fifth section of "An act in addition to an act to promote the progress of science and the useful arts," approved March 3d, 1837, they having paid thirty dollars into the treasury of the United States for the said

1859

additional patent, and complied, in all other respects, with the requirements of the law.

CHARLES ST. JOHN,
H. A. BURR,
A. H. WRIGHT,
JAS. M. RIBLET.

STATE OF NEW YORK,
City and County of New York, ss:

On this 13th day of September, A. D. 1856, before me personally came Charles St. John, H. A. Burr, A. H. Wright, and James M. Riblet, and being severally duly sworn, each for himself did depose and make oath that the foregoing petition, by him subscribed, contains the truth, the whole truth, and nothing but the truth.

PETER T. MARSELIS,
Com. of Deeds.

STATE OF NEW YORK,
City and County of New York, ss:

On this 13th day of September, 1856, before me personally came Charles St. John, H. A. Burr, A. H. Wright, and James M. Riblet, and being severally duly sworn, each for himself did depose
344 and say that the contents of the foregoing specification, by him subscribed, are true.

PETER T. MARSELIS,
Com. of Deeds.

Hon. Com. of Patents:

SIR: We hereby appoint Alex. P. Browne (in connection with Charles M. Keller as counsel) to act as our attorney in presenting the inclosed application for the re-issue of Henry A. Wells's patent, dated April 25th, 1846, for making fur hat-bodies.

CHARLES ST. JOHN,
H. A. BURR,
JAS. M. RIBLET,
A. H. WRIGHT.

New York City, Sept. 13th, 1856.

345 DEFENDANTS' EXHIBIT, No. 8.

The United States Patent Office to all persons to whom these presents shall come, greeting.

This is to certify that the annexed is a true copy from the files and records of this office, of all papers (except drawing and patent, as reissued) in the matter of the application of Henry A. Burr, assignee for re-issue of letters patent of April 25th, 1846. The said copies show the erasures, interlineations, as they appear in the original.

In testimony whereof, I, S. T. Shugert, commissioner of patents,
[L. S.] have caused the seal of the Patent Office to be hereunto affixed this twenty-first day of December, in the year of our Lord one

thousand eight hundred and sixty, and of the independence of the United States the eighty-fifth.

S. T. SHUGERT.

To the Commissioner of Patents:

The petition of Henry A. Burr, of the city, county, and State of New York, respectfully represents, that letters patent of the United States were granted unto Henry A. Wells, for certain new and useful improvements in machinery for making hat-bodies of fur, bearing date the 25th day of April, 1846; and the said letters patent were surrendered and re-issued on an amended specification, on the 30th day of September, 1856, and extended for the further term of seven years, from the 25th day of April, 1860; that your petitioner now believes that the same is inoperative by reason of a defective specification, which defect has arisen from inadvertence and mistake. He therefore prays that he may be allowed to surrender the same, and requests that new letters patent may issue to him, (as sole assignee,) for the same invention, for the residue of the period for which the original patent was extended, under the amended specification herewith presented, he having paid fifteen dollars into the treasury of the United States, agreeably to the requirements of the act of Congress in that case made and provided.

346 And your petitioner hereby authorizes Charles M. Keller to act as his attorney in presenting this application, altering or withdrawing the same, as the case may require, and to receive the patent when granted.

H. A. BURR.

To all whom it may concern:

Be it known that Henry A. Wells, late of the city, county and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in machinery for making hat-bodies of fur, for which said improvement letters patent of the United States were granted to said Wells, bearing date the 25th day of April, 1846, and that the following is a full, clear and exact description of the principle and character which distinguishes the said invention from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this description, in which figure 1 is a plan of the machine; figure 2, a longitudinal vertical section; and figure 3, a longitudinal elevation. The other figures will be described in their appropriate places. The same letters indicate like parts in all the figures.

It has long been essayed to make hat-bodies by throwing the fibres of fur, wool, etc., from a *carding-engine* into the open air, over a perforated cone, exhausted by a fan below, to draw down and hold the fibres thereon by the currents of air that rush from all directions towards and through the apertures of the cone, and thus to form a bat of fibres, *to be afterwards held together by immersion in some glutinous composition;** but from various causes all these attempts have failed.

* Modified.

And a patent was granted to William Fosket, bearing date the 23d day of January, 1846, for a machine, in which the fibres to be formed into a hat-body are drawn by suction through a tube into the lower part of a chamber surrounding a pervious cone or former, the inside of which is connected with an exhausting fan, to exhaust the air from the inside thereof, to induce currents in the surrounding air, to rush in all directions towards the outer surface of the pervious former, and through the apertures thereof, and thus to carry the fibres from the lower part of the surrounding chamber towards, and deposit and hold them on the outer surface of the said former.

347 Hat-bodies are required to be made thick at and near the rim, and thin along the crown and tip, that the required strength may be given where it is required, without making the hat too heavy, and at too great a cost of material. This disposition of the fur can be obtained by the skill and judgment of the workman, by the hand-process, known under the name of "bowing," but cannot by the plans above referred to, for the reason that the fibres are only controlled by the currents induced through the apertures of the cone, or other former, by exhausting the air from the inside of it, instead of being properly directed for distribution on to the surface of the cone or other former. When the fibres are not properly directed, but are drawn to the surface by the action of the exhaust, the force thus induced gradually decreases as the apertures in the cone are closed up by the accumulation of the fur deposited on the outer surface thereof, and, in consequence, the required distribution cannot be obtained.

The mode of operation of the said invention of the said Henry A. Wells is such that the fur fibres are directed and controlled so as to travel from the picker* towards the surface of the pervious cone, or other former, that they may be deposited thereon to the thickness required to make a bat of uniform thickness all around, and of the required varying thickness from brim to tip, and this mode of operation results from combining with a rotary picker† and a pervious cone, or equivalent former, connected with an exhausting apparatus, suitable means for directing and controlling the fur-bearing current.

The said mode of operation, invented by the said Henry A. Wells, is embodied in the following description of the mode of application, reference being had to the accompanying drawings, in which (a) is a frame properly adapted to the operative parts of the machine, and (b) the lower feed-apron, on which the stock or fur is spread, by the attendant, in separate parcels, each sufficient for the formation of a hat, according to its intended weight. This apron, or endless belt of cloth, or other suitable material, passes around a roller (c)

348 and a lip (d;) the former at the back of the machine, with its bearings in sliding-boxes, governed by set screws (e e,) for the purpose of tightening the apron; and the latter near to the rotating brush (f,) and so formed as to present a slightly rounded edge for the apron to pass over, where it presents the fur to the action of the

*See substitute A, filed November 12, 1860.
†See substitute A, filed November 12, 1860

picker. Instead of this slightly rounded edge a small metallic roller may be substituted; but when this is done the roller should be supported at different points between its end-journals, by letting it run in a circular grove in the lip, as represented in section at figure 4, where (g) indicates the roller. The fur, as it is carried along towards the lip (d,) is gradually compressed by the upper apron (b,) which passes around a feed-roller (c^1) and lip (d^1,) in manner similar to the under feed-apron. The roller (c^1) runs in a frame (i^1,) of which the lip (d^1) forms part, hung on journals that rest in standards (j^1,) so that the lip (d^1) can be made to press on to the fur between it and the under lip (d,) and thus gripe the fibres and present them to the effective action of the picker (f.) The under plane of the upper apron (b^1) is inclined to the upper plane of the lower one (b,) the more effectually to present the fibres in the proper manner to the picker.

The roller (c^1) of the upper apron runs in sliding-boxes, governed by set-screws (e^1, e^1,) and is placed forward of the journals of the frame, so that the tension of the belt (i^2,) which communicates motion from the lower roller (c) to the upper one (c^1,) may press the upper lip (d^1) on the under lip (d;) but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure under similar circumstances.

The fibres, as they pass from the feed-aprons, are acted upon by a brush or picker (f,)* that rotates with great velocity, and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed, if desired. As the fibres are first presented they are brushed and properly laid by the downward action of the brush, as indicated by the arrow, and when liberated are carried down the curved surface (l) of a chamber or tunnel (m;) and at the lower edge of this they meet a current of air that
349 enters a narrow aperture (n) near the bottom of the chamber, and extending the whole length of the *picker*,† which being induced by the rotation of the *picker*,‡ and the partial vacuum in the perforated cone (o) aids in carrying and giving direction to the fur-bearing current towards the surface of the perforated cone (o.) This chamber extends over and under the *picker*§ and the forward part of the lips, and turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush. Its bottom rests on a set screw (p,) to regulate the delivery end of the chamber relatively to the cone. Its forward end, in addition to this, is provided with a hinged deflector (q,) regulated by a cam lever, or other suitable means, to regulate the delivery of the fibres at and near the base of the cone. The top (r) of this trunk is gradually elevated, and its sides are contracted, to make the delivery aperture nearly of the form of the cone, but narrower and higher; and its upper part is provided with a deflector (s) so curved as to correspond generally with the curve of the tip of the cone. This deflector is hinged to the upper part of the delivery aperture of the chamber, and is connected with an eccentric (t) by means of a cord

* See substitute A, filed November 12, 1860.
† See substitute A, filed November 12, 1860.
‡ See substitute A, filed November 12, 1860.
§ See substitute A, filed November 12, 1860.

(u) and *bell-crank* (u^1)* that passes over a pulley (v,)* so that each revolution of this eccentric carries the hood up and down, to direct the discharge and distribute the fibres on to the cone, a greater thickness being desirable in the parts of the bat which form the brim than on the tip and crown; and when it is desired still further to diversify the distribution of the fibres, other means can be substituted for the eccentric, and the connection between it and the deflector is formed as represented in figure 5, where the cam (t) acts on the lever (t^1) connected by the cord (u).

The cone (o) is made in the usual manner, but of thin sheet metal, perforated, that being better than wire gauze. Its lower edge fits in a metallic ring (w) that runs in an appropriate collar in the upper part of a case (x,) and its outer periphery is provided with cogs that mash into the cogs of a pinion (y) concealed in the drawing by the pulley (d^2) on a vertical shaft (z,) by which a slow, rotary motion is given to the cone, as the fibres are thrown on to it, to distribute them equally all around. The case (x) may be made sufficiently long to receive two rings (w,) one on each side of the pinion (y,) by which both are kept in motion, and it (the case,) may be made to swivel on a hollow collar (f^1,) to which its bottom is fitted, so that when a bat is formed on one cone, it may be turned aside by turning the case half a revolution, and another cone put on to the other ring, that another bat may be in the process of forming, whilst the one already formed may be prepared for the hardening process in the manner to be hereafter described.

The case (x) communicates through the hollow collar (f^1) with an exhausting fan blower (g^1,) which consists of a vertical arbor (h^1) with oblique vanes (i^1,) so that when rotating with great velocity, in the direction of the arrow, the air is exhausted from the case (x) and the inside of the perforated cone (o). When one of the cones is removed from one of the rings (w) to be taken to the hardening apparatus, the aperture in the ring (w) must be closed up with a cap-plate (w^2) to prevent the passage of air. Any other mode of exhausting the case and cone may be employed, but this is deemed the best.

All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying drawings, in which (m^1) is a main line shaft overhead driven by any first mover. From a wheel (n^1) on it, a band (o^1) extends to a pulley (p^1) on the shaft of the brush, which should make about two thousand revolutions per minute, more or less. From another wheel (q^1) on this same shaft, a band (r^1) extends to a pulley (s^1,) on the shaft of which there is a wheel (t^{11}) that drives the exhaust fan (g^1) by the belt (u^{11}.) And from a pulley (v^1) on the same line shaft, a belt extends to a wheel (w^1,) on the shaft of which there is a pulley (x^1,) from which extends another belt (y^1) to a wheel (z^1) on the shaft (a^2) that carries the eccentric (t,) to give all the reduced motions required for the other parts of the machinery. From a wheel (b^2,) on this shaft, a belt (c^2) extends to a pulley (d^2) on the shaft (z) that rotates the cone (o.) And another pulley (e^2) drives the wheel (f^2) of the feed-

* See amendment B, filed November 12, 1860.

roller (c) by the belt (g^2); and on the other end of the axle of
351 this feed-roller there is a pulley (h^2) which drives, by a cross-belt (i^2,) the upper feed roller (c^1.) If desired, an alarm can be connected with the feed-roller of the lower apron to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arbor of the feed-roller (c) of the lower feed-apron by a belt with a wheel (k^2) provided with a cam or pin to lift, at every revolution, the hammer (l^2) of a bell (m,^{2}) the striking of which shall give requisite indication.

It will be obvious from the foregoing that the upper deflector (s) may be operated or adjusted by hand, instead of machinery, thus substituting the attention, skill, and cost of the operative, for the positive regularity and cheapness of mechanical movements.

The preparation of the formed bat for hadening is effected by covering it with pieces of felt or fulled cloth, just taken from hot water, and this is done in the following manner, namely: The attendant takes from a kettle of hot water a piece of felt cloth, rolled up on a roller, and applies one end of it to the surface of the bat, and as the cone rotates, the felt cloth winds from the roller on to the bat on the cone. Another piece of felt cloth is put on the top, and a strong perforated metallic cone (k^1) (see figure 6) is put over the whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them whilst it is immersed in hot water to harden. As the perforated cone (o) is better when made very thin, the pressure of the water when drawing it out of the kettle, after the bat has been hardened, tends to and would collapse it, and therefore to prevent this another perforated metallic cone (t^{111}) (see figure 7) is put inside, (before the whole is immersed in hot water,) to sustain the pressure in drawing the whole out of the hardening kettle. The relative situation of the three cones, the bat, and the covering of felt cloth, preparatory to the hardening process, is represented on an enlarged scale at figure 8, which is a vertical section through the whole. The inner sustaining cone may be dispensed with if desired, by making the cone (o) of greater thickness and strength.

Having thus described the mode of application of the said in-
352 vention of the said Henry A. Wells, as the same was successfully reduced to practice by him, I do not wish to be understood as limiting the claim of my invention to such mode of application, as other modes may be devised, having the same mode of operation or principle, and only differing from it in form, or in the substitution of equivalent means.

Nor do I wish to be understood as making claim herein to the combined process of forming and of hardening hat-bodies on pervious cones, or other analogous formers, preparatory to taking them off in a suitable condition for the after process of sizing by felting, as this is the subject of another patent.

What I claim is the invention of the said Henry A. Wells, in machinery for forming bats of fur-fibres in the manufacture of fur hat-bodies, is the mode of operation, substantially as herein described, of forming bats of fur fibres of the required varying thickness from brim to tip, which mode of operation results from the combination of

the rotating picking mechanism or the equivalent thereof, the pervious former and its exhausting mechanism, or the equivalent thereof, and the means for directing the fur-bearing current, or the equivalent thereof, as set forth.

I also claim the combination of the rotating *picker*,* the pervious former, with its exhausting mechanism, and the deflector substantially as described, to regulate the deposit of the fur fibres on the lower part of the former, as described.

I also claim the combination of the rotating *picker*,* the pervious former, with its exhausting mechanism, and the tip-deflector, substantially as described, to regulate the deposit of the fur fibres on the tip of the pervious former, as set forth.

And finally, I claim the combination of a rotating *picker*,† the pervious former, with its exhausting mechanism, and the means described or the equivalent *therefor*,‡ for inducing a current of air to aid in carrying and giving direction to the fur, and *insure*§ its proper deposit on the surface of the pervious former, as required, as set forth.

H. A. BURR.

Witnesses:
ANDREW DE LACY.
GEO. H. STREET.

353 *City, County, and State of New York, ss:*

On this ninth day of October, 1860, before me, a commissioner of deeds, personally appeared the within-named Henry A. Burr, and made solemn oath that he verily believes that, by reason of an insufficient or defective specification, the aforesaid patent is not fully available to him, as assignee; that the said error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention, to the best of his knowledge or belief; and that he is a citizen of the United States.

HORACE ANDREWS,
Commissioner of Deeds.

Honorable Commissioner of Patents:

SIR: I have the honor to inclose herewith the specification, duplicate, drawings, and certificate, for the fee of fifteen dollars, in the matter of the application of H. A. Burr, assignee, for the reissue of letters patent granted to H. A. Wells, April 25th, 1846, and extended April 17th, 1860, for making hat-bodies.

The old patent is also inclosed.

I remain, sir, yours, respectfully,

CHARLES M. KELLER,
By WM. H. BISHOP.

NEW YORK, *October 9th*, 1860.

* See substitute C, filed Nov. 12, 1860.
† See substitute D, filed Nov. 12, 1860.
‡ See substitute E, filed Nov. 12, 1860.
§ See substitute E, filed Nov. 12, 1860.

NEW YORK, *November* 10*th*, 1860.

Hon. PHILIP F. THOMAS, *Commissioner of Patents:*

SIR: I have received your letter of the 5th inst., with the specification and one drawing of Mr. H. A. Burr's application for the reissue of letters patent, granted to H. A. Wells, for a machine for forming hat-bodies, and requiring certain amendments in the specification, some of which have been made.

As to the suggested amendment on the first page, by striking out the words "carding engine," and substituting the word "picker," to make it conform to the specification of the original patent, I have to remark that in this respect the original patent was defective.

354 This part of the specification relates to the state of the arts pre-existing Wells's invention, and the prior essays therein referred to were those of Thomas R. Williams, of England, and it will be found, by reference to his English patents of 1833 and 1837, and to the cancelled part of his application on which a patent was granted to him in 1840, that in the machines for forming hat-bodies, instead of a *picker*, the fur is carded and thrown from the *carding engine* by a doffer fan. This was a mistake made by myself in drafting Wells's original specification, and is a misstatement of the facts, and if the department desire it, I will send my affidavit, that these were the only machines intended to be referred to in the original specification, and that the error, in stating "*picker*," instead of "carding engine," was my own mistake, and that the only error of Wells was, in executing the specification without sufficient revision. I would further observe that this can have no legal bearing on the claim, as no one pretends that a claim can be made to the picker at any time.

The other suggested amendments have been made to conform to the suggestions. The word "picker" was used because it was believed to be more expressive of the operation performed by the instrument used and represented, for the bristles do pick and disintegrate the fibres as they are presented by the feed-apron between the griping lips. And although it is stated in the original patent that the fur is taken after it has been picked, yet it is equally true that it becomes matted by handling in putting it on the feed-apron, and in passing through the feeding apparatus, and that it must be again picked or disintegrated, and that the brush does act as a picker, and that unless it did so act the hat-bodies made on the machine would be worthless. It is immaterial, whether the points which act on the fur be bristles or metal wires, although a brush made of bristles is the best, as it picks or separates the fibres more perfectly than a brush or picker made of metal wires.

The second, third, and fourth claims have been amended so as to avoid the objections indicated.

I remain, very respectfully, yours,

CHAS. M. KELLER.

355 *Honorable Commissioner of Patents:*

SIR: I hereby authorize J. N. McIntire, of Washington city, D. C., to act as my attorney, in connection with C. M. Keller, in the

matter of my application for the *reissue* of letters patent granted to H. A. Wells, deceased, on the 25th day of April, 1846, and extended April 17th, 1860, for the process of manufacturing hat-bodies.

H. A. BURR.

U. S. PATENT OFFICE, *November 5th*, 1860.

SIR: The specification in division A, of the application for the reissue of H. A. Wells' patent for manufacturing hat-bodies, is herewith returned for amendment, as follows:

The words "carding engine," on the 1st page, are objected to, and the word "picker" suggested as a substitute.

The word "picker," in the 3d and subsequent pages, is objected to for this reason, amongst others, that in your original specification, filed in 1845, you state that you take the fur, after the picking operation, and feed it to a rotating brush.

The name "picker," in manufactures, is now applied to a machine which is used in a particular stage of the preparation of the raw fibrous stock, and it cannot be correctly applied to your brush, although your brush does separate the stock. The words "separating brush," or "picking brush," would be more descriptive of your invention, in the opinion of the office.

The second and third clauses of your claim are not complete.

One set of your drawings are also herewith returned.

Respectfully yours,

PHILIP F. THOMAS,
Commissioner.

H. A. BURR,
Care J. N. McIntire, Washington, D. C.

A.

I hereby amend my specification of my application, division
356 A, for the reissue of letters patent granted to H. A. Wells, on the 25th of April, 1846, and reissued on the 30th of September, 1856, by striking out the word "picker," in the 7th and in the 12th line, on page 3d, and in the 6th, the 18th, the 19th, and the 24th lines, on page 5th, and inserting in lieu thereof, in each of the said places, the words "picking or disintegrating brush."

B.

Also, on the 6th page, by striking out the words, "and bell-crank (u^1,)" in the 14th line, and inserting after the letter (v,) in the 15th line, the words, "and which is attached to a bell-crank (u^1.)"

C.

And also, by striking out the second and third clauses of the claim, and inserting in lieu thereof the following, namely: "I also claim the combination of the rotating picking mechanism, or the equivalent thereof, the pervious former, with its exhausting mechanism, and the

lower deflector, substantially as described, to regulate the deposit of the fur fibres on the lower part of the former, as described.

"I also claim the combination of the rotating picking mechanism, or the equivalent thereof, the pervious former, with its exhausting mechanism, and the upper deflector, substantially as described, to regulate the deposit of the fur fibres on the tip of the pervious former, as set forth."

D.

And also, by striking out the work "picker," in the second line of the last claim, and inserting in lieu thereof the words, "picking mechanism."

E.

Also, by striking out the word "therefor," in the fourth line of the last claim, and substituting the word "thereof;" and also, by striking out the word "insure," in the sixth line of the last claim, and substituting therefor the word "insuring."

H. A. BURR,
By his attorney, CHAS. M. KELLER.

New York, November 10th, 1860.

357 [*Revision No.* 238.]

UNITED STATES PATENT OFFICE,
Washington, Nov. 14th, 1860.

SIR: Having examined the application of H. A. Burr, assignee of E. Wells, (reissue,) for improvement in machinery for making hat-bodies, we approve the action of the examiner having charge of the case, and recommend that a patent be allowed accordingly.

Respectfully submitted.

WM. B. TAYLOR,
T. R. PEALE,
Revising examiners.

Hon. P. F. THOMAS,
Commissioner of Patents.

U. S. PATENT OFFICE, *November 14th,* 1860.

The above report is approved, and a patent allowed.

PHILIP F. THOMAS,
Commissioner.

A.

Reissue—No. 1,086.

Henry A. Burr, assignee of Eliza Wells, administratrix of H. A. Wells, deceased, of New York, county of New York, State of New York. Manufacturing hat-bodies.

Received October 10, 1860. Petition, October 10, 1860. Affidavit, October 10, 1860. Specification, October 10, 1860. Two drawings,

October 10, 1860. Old Patent, October 10, 1860. Cert. dep.,
358 $15, October 10, 1860. Cash. Examined, November 13, 1860. Van S. Issue, Shugert, November 22, 1860. Patented April 25, 1846. Reissued, September 30, 1856. Extended seven years. Again reissued December 4, 1860. Recorded, vol. 9, page 38.

J. N. McINTIRE, *W., D. C.*
C. M. KELLER, *N. Y.*

359 Counsel for defendants gives in evidence a certified copy of the record of application and correspondence in the matter of the letters patent reissued to H. A. Burr, assignee of H. A. Wells, December 4th, 1860, (process patent,) marked exhibit 9, consisting of application and specification of H. A. Burr, 1086, (proceeds patent;) Keller to Commissioner, Oct. 7th, 1860; Burr to Commissioner; Commissioner to Burr; Keller to Commissioner, Nov. 17th, 1860. Amendments of Burr, filed Nov. 19th, 1860; certificate of revision and file wrapper.

The counsel for complainant objects to the introduction of the record, and to each part of the same offered by the defendants' counsel, and marked exhibit 9, upon the ground that the same is not competent evidence, and that none of the parts constituting the record are admissible as evidence; also, that the same is not sufficiently authenticated, and that there is no law authorizing the admission in evidence on a certificate of the Commissioner of Patents with the seal of the Patent Office.

DEFENDANT'S EXHIBIT, No. 9.

The United States Patent Office to all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the files and records of this office of all papers (except drawing and patent as reissued) in the matter of the application of Henry A. Burr, assignee for reissue of letters patent of April 25th, 1846. The said copies show the erasures, interlineations and marginal notes as they appear in the original.

In testimony whereof, I, S. T. Shugert, Commissioner of Patents,
[L. S.] have caused the seal of the Patent Office to be hereunto affixed, this twenty-first day of December, in the year of our Lord one thousand eight hundred and sixty, and of the independence of the United States the eighty-fifth.

S. T. SHUGERT.

360 *To the Commissioner of Patents:*

The petition of Henry A. Burr, of the city, county, and State of New York, respectfully represents that letters patent of the United States were granted unto Henry A. Wells for certain new and useful improvements in the process of making hat-bodies of fur, bearing date the 25th day of April, 1846; that the said letters patent were surrendered and reissued on an amended specification on the 7th day of

October, 1856, and extended for the further term of seven years from the 25th day of April, 1860; that your petitioner now believes that the same is inoperative by reason of a defective specification, which defect has arisen from inadvertence and mistake. He therefore prays that he may be allowed to surrender the same, and requests that new letters patent may issue to him, (as sole assignee,) for the same invention, for the residue of the period for which the original patent was extended under the amended specification herewith presented, he having paid fifteen dollars into the treasury of the United States, agreeably to the requirements of the act of Congress in that case made and provided.

And your petitioner hereby authorizes Charles M. Keller to act as his attorney in presenting this application, altering or withdrawing the same, as the case may require, and to receive the patent when granted.

H. A. BURR.

To all whom it may concern: Be it known that Henry A. Wells, late of the city, county, and State of New York, now deceased, did, in his lifetime, invent certain new and useful improvements in the process of making hat bodies of fur, for which said improvements, in connection with machinery for forming the bats, letters patent of the United States were granted to the said Wells, bearing date the 25th day of April, 1846, and that the following is a full, clear, and exact description of the principle or character which distinguishes the said invention from all other things before known, and of the manner of working the same, reference being had to the accompanying drawings, making part of this description, in which figure 1 is a plan of the machine; figure 2, a longitudinal vertical section; and figure 3, a longitudinal elevation. The other figures will be described in their appropriate places. The same letters indicate like parts in all the figures.

361 Prior to the invention of the said Henry A. Wells, fur hat-bodies were made by what is known as the "bowing process," by which two flat bats were separately formed, and then united at the edges, and then hardened and felted; and although attempts have been made to avoid the difficulties presented by this process, such attempts were not successful; so that, at the date of the said invention of the said Wells, the bowing process was the only one practically used in the manufacture of fur hat-bodies.

By the invention the said Henry A. Wells, fur hat-bodies are made directly of the required form, and in a suitable condition for the after process of sizing by felting.

And the said invention consists in effecting this result by the combination of two consecutive processes, the first of which is to form a bat of fur fibres of the required thickness by depositing the fur on to the surface of a pervious cone or former connected with an exhausting apparatus to exhaust the air from the inside thereof, that the fur fibres, so deposited, may be held thereon by the pressure of the surrounding air. And the second of which processes is to harden the bat of fur fibres so formed while on the said pervious cone or former, by partially felting the same while on such cone or former, to give it the

required consistency to admit of taking it off in a suitable condition for the after and usual process of sizing by felting. By means of this combination of processes, fur hat-bodies can be made directly of the form, and of any varying thickness required.

The following is a description of the means suitable for applying the said combined process to practice, although other and equivalent means may be employed for working the combined process invented by the said Wells.

Having thus pointed out the principle or character of the said invention of the said H. A. Wells, the special mode of application will be next described.

The first branch of the said process may be worked by means of a machine represented in the accompanying drawings, and which is believed to be the best means, although other and equivalent means may be employed for the purpose, and no claim is herein made to the machinery described, as that is claimed in another patent.

362 In the accompanying drawings (a) represents a frame properly adapted to the operative parts of the machine, and (b) the lower feed-apron, on which the stock or fur is spread by the attendant, in separate parcels, each sufficient for the formation of a hat, according to its intended weight. This apron or endless belt of cloth, or other suitable material, passes around a roller, (c,) and a lip, (d;) the former at the back of the machine, with its bearing in sliding-boxes governed by set screws, (e, e,) for the purpose of tightening this apron; and the latter near to the rotating *picker** (f,) and so formed as to present a slightly rounded edge to the apron to pass over where it presents the fur to the action of the *picker*.† Instead of this slightly rounded edge, a small metallic roller may be substituted; but when this is done, the roller should be supported at different points between its end journals by letting it run in a circular groove in the lip, as represented in section at figure 4, where (g) indicates this roller. The fur, as it is carried along towards the lip (d,) is gradually compressed by the upper apron (b^1,) which passes around a feed apron (c^1) and a lip (d^1) in a manner similar to the under feed-apron. The roller (c^1) runs in a frame (i^1) of which the lip (d^1) forms part, hung on journals that rest in standards (j,) so that the lip (d^1) can be made to press on to the fur between it and the under lip (d,) and thus gripe the fibres and present them to the effective action of the *picker*‡ (f.) The under plane of the upper apron (b^1) is inclined to the upper plane of the lower one (b) the more effectually to present the fibres in the proper manner to the *picker*.§

The roller (c^1) of the upper apron runs in sliding boxes, governed by set screws (e^1, e^1,) and is placed forward of the journal of the frame, so that the tension of the belt (i^2) which communicates motion from the lower roller (c) to the upper one (c^1,) may press the upper lip (d^1) on the under lip (d;) but this may be effected by means of springs, weights, or other well-known mechanical devices for making pressure under similar circumstances.

*See substitute A, filed November 19, 1860. †See substitute A, filed November 19, 1860.
‡See substitute B, filed November 19, 1860. §See substitute B, filed November 19, 1860.

363 The fibres, as they pass from the feed-aprons, are acted upon by a brush or *picker** (f) that rotates with great velocity, and which is composed of parallel rows of stiff bristles projecting from a cylinder, but which may be differently constructed and composed, if desired. As the fibres are first presented, they are brushed and properly laid by the downward action of the brush, as indicated by the arrow, and when liberated are carried down the curved surface (l) of a chamber or tunnel (m ;) and at the lower edge of this they meet a current of air that enters a narrow aperture, (n,) near the bottom of the chamber, and extending the whole length of the *picker*,† which being induced by the rotation of the *picker*‡ and the partial vacuum in the perforated cone (o) aids in carrying and giving direction to the fur-bearing current towards the surface of the perforated cone (o.) This chamber extends over and under the *picker*§ and the forward part of the lips, and turns on the journals of the brush, or is otherwise so arranged as to have a slight motion, the axis of which is the same as that of the brush. Its bottom rests on a set screw (p) to regulate the delivery end of the fur at or near the base of the cone. Its forward end, in addition to this, is provided with a hinged *deflector*‖ (q,) regulated by a cam, levers, or other suitable means to regulate the delivery of the fibres at and near the base of the cone. The top (r) of this trunk is gradually elevated, and its sides are contracted, to make the delivery aperture nearly of the form of the cone, but narrower and higher. And its upper part is provided with a *deflector*¶ (s) so curved as to correspond generally with the curve of the tip of the cone. This *deflector*** is hinged to the upper part of the delivery aperture of the chamber and is connected with an eccentric (t) by means of a cord (u) *and a bell crank* (u^1)†† that passes over a pulley (v,)‡‡ so that each revolution of this eccentric carries the hood up and down to direct the discharge and distribute the

364 fibres on to the cone, a greater thickness being desirable in the parts of the bat which form the brim than on the tip and crown ; and when it is desired still further to diversify the distribution of the fibres, other means can be substituted for the eccentric, and the connection between it and the deflector is formed as represented in section at figure 5, where the cam (t) acts on the lever (t^1) connected by the cord (u.)

The cone (o) is made in the usual manner, but of thin sheet metal, perforated, that being deemed better than wire-gauze. Its lower edge fits in a metallic ring (w) that runs in an appropriate collar in the upper part of a case, (x,) and its periphery is provided with cogs that mash into the cogs of a pinion (y) concealed in the drawing by the pulley (d^2) on a vertical shaft, (z,) by which a slow rotary motion is given to the cone as the fibres are thrown on to it, to distribute them equally all around the cone. The case (x) may be made sufficiently long to receive two rings (w,) one on each side of the pinion

° See C, filed November 19, 1860.
† See substitute D, filed Nov. 19, 1860.
‡ See substitute D, filed Nov. 19, 1860.
§ See substitute D, filed Nov. 19, 1860.
‖ See substitute E, filed Nov. 19, 1860.
¶ See substitute E, filed Nov. 19, 1860.
°° See substitute E, filed Nov. 19, 1860.
†† See F, filed Nov. 19, 1860.
‡‡ See also F, filed Nov. 19, 1860.

(y,) by which both are kept in motion; and it (the case) may be made to swivel on a hollow collar (f^1) to which its bottom is fitted, so that when one cone is covered it may be turned aside by turning the case half a revolution, and another cone put on to the other ring, that another bat may be in the process of forming, whilst the one already formed may be prepared for the hardening process in the manner to be hereafter described.

The case (x) communicates through the hollow collar (f^1) with an exhausting fan-blower (g^1) which consists of a vertical arbor (h^1) with oblique vanes (i^1,) so that when rotating with great velocity in the direction of the arrow, the air is exhausted from the case (x) and the inside of the perforated cone (o.) When one of the cones is removed from one of the rings (w) to be taken to the hardening apparatus, the aperture in the ring (w) must be closed up with a cap-plate (w^2) to prevent the passage of air. Any other mode of exhausting the case and cone may be employed, but this is deemed the best.

All the operative parts may be set in motion by any of the known means, such as belts, as fully represented in the accompanying
365 drawings, in which (m^1) is a main line shaft overhead, driven by any first mover. From a wheel (n^1) on it a band (o^1) extends to a pulley (p^1) on the shaft of the brush, which should make about two thousand revolutions per minute, more or less. From another wheel (q^1) on this same shaft, a band (r^1) extends to a pulley (s^1) on the shaft of which there is a wheel (t^{11}) that drives the exhaust-fan (g^1) by the belt (u^{11}.) And from a pulley (v^1) on the same line shaft a belt extends to a wheel (w^1,) on the shaft of which there is a pulley (x^1,) from which extends another belt (y^1) to a wheel (z^1) on the shaft (a^2,) that carries the eccentric (t) to give all the reduced motions required for the other parts of the machinery. From a wheel (b^2) on this shaft a belt (c^2) extends to a pulley (d^2) on the shaft (z) that rotates the cone (o.) And another pulley (e^2) drives the wheel (f^2) of the feed-roller (c) by the belt (g^2;) and on the other end of the axle of this feed-roller there is a pulley (h^2) which drives, by a cross-belt, (i^2,) the upper feed-roller (c^1.) If desired, an alarm can be connected with the feed-roller of the lower apron, to announce to the attendant when each charge of stock is exhausted, that the cones may be shifted. This can be done by connecting the arbor of the feed-roller (c) of the lower feed-apron by a belt with a wheel (k^2) provided with a cam or pin, to lift at every revolution the hammer (l^2) of a bell, (m^2,) the striking of which shall give requisite indication.

The fibres constituting the bat formed by the deposit of fur bodies, whether by the machinery herein described, but not reclaimed herein, or by any equivalent means, such as the Fosket machine, are only held together by the pressure of the surrounding air, induced by exhausting the air from the inside of the pervious cone, and before the bat can be removed, it must be partially felted, termed "hardened," to give it the required consistency to admit of handling. And it will be obvious that this partial felting of the bat cannot be performed on the cone by any of the known processes of partial felting unless the fibres be held to the surface of the cone by some means. The mode of working this branch of the combined process, which was adopted

by the said Wells, is as follows, namely: So soon as the bat is formed, the attendant takes from a kettle of hot water a piece of cloth, (felt cloth being best,) rolled upon a roller, and applies one end
366 of it to the surface of the bat, and as the cone rotates, the cloth winds from the roller on to the bat on the cone. This only covers the straight or conical part of the bat, but not the rounded tip, which, being generally the thinnest and most delicate, it is important to harden. This part of the bat is covered by another piece of cloth, and then a strong metallic cone (k^1) (figure 6) is put over the whole, the more effectually to hold the fibres of the bat, and to make a slight pressure on them, whilst the whole is immersed in hot water to harden or partially felt the bat by the circulation of the hot water through the apertures of the two cones and through the bat. As the perforated cone (o) is better when made very thin, the pressure of the water when drawing it out of the kettle, after the bat has been hardened, tends to collapse it, and, therefore, to prevent this, another perforated metallic cone (t^{111}) (figure 7) may be put inside, (before the whole is immersed in hot water,) to sustain the pressure in drawing the whole out of the kettle. The relative situation of the three metallic cones, the bat and the covering of felt cloth, are represented on an enlarged scale at figure 8, which is a vertical section through the whole. The inner cone may be dispensed with if the cone (o) be made of sufficient strength. By this mode of application of the second branch of the said process, the pressure of the surrounding air, for holding the fibres to the surface of the pervious cone, can be suspended so soon as the bat is covered, so that the whole can be removed from the exhausting apparatus to be hardened while another bat is being formed on another cone.

And, although the mode of application of the second branch of the said compound processes above described is deemed the best, I do not, however, wish to be understood as limiting the claim of invention to such mode of application as the partial felting of the bat on the pervious cone may be effected by other and equivalent modes of felting, so long as the fibres constituting the bat are held to the surface of the cone by suitable pressure during the felting or hardening.

What I claim as the invention of the said Henry A. Wells is the combined process of forming fur hat-bodies by depositing fur fibres to a suitable thickness on the surface of a pervious former, of the
367 required shape, and holding them thereon, by the pressure of the surrounding air, as they are deposited, and then hardening or partially felting the bat so formed, and while it is held by suitable pressure on to the surface of the former, to give it the required consistency to admit of removing it therefrom in a suitable condition for the after process of sizing by felting, as set forth.

H. A. BURR.

Wittnesses:
ANDREW DE LACY.
GEO. H. STREET.

CITY, COUNTY, STATE OF NEW YORK, *ss:*

On this ninth day of October, 1860, before me, a commissioner of deeds, personally appeared the within-named Henry a Burr, and made solemn oath that he verily believes that, by reason of an insufficient or defective specification, the aforesaid patent is not fully available to him, as assignee; and that the said error has arisen from inadvertence, accident, or mistake, and without any fraudulent or deceptive intention, to the best of this knowledge or belief, and that he is a citizen of the United States.

HORACE ANDREWS,
Commissioner of Deeds.

Hon. Commissioner of Patents:

SIR: I have the honor to inclose herewith the specification, duplicate drawings, and certificate for the fee of fifteen dollars, in the matter of the application of H. A. Burr, assignee for the reissue of letters patent granted to H. A. Wells, April 25th, 1846, and extended April 17th, 1860, for making hat-bodies.

The old patent is also inclosed.

I remain, sir, yours, respectfully,

CHAS. M. KELLER,
By WM. H. BISHOP.

NEW YORK, *October* 9, 1860.

Hon. Commissioner of Patents:

368 SIR: I hereby authorize J. N. McIntire, of Washington, D. C., to act as my attorney, in connection with C. M. Keller, in the matter of my application for the reissue of letters patent granted to H. A. Wells, deceased, on the twenty-fifth day of April, 1846, and extended April 17th, 1860, for machinery for manufacturing hat-bodies.

H. A. BURR.

U. S. PATENT OFFICE, *November* 5, 1860.

SIR: The specification in division B, of your application for the reissue of the patent of Henry A. Wells, dated April 25th, 1846, is herewith returned for amendment.

The word "picker," on the 4th and subsequent pages, has been substituted for the word "brush," and the office does not see any propriety in the change. Your brush can act as a picker or separator, in a limited sense, but its office is not correctly designated by the word "picker," unless some proper qualifying words are connected with it.

Perhaps the phrase "picking-brush," or "separating-brush," might be agreed upon as more correct. On the 5th page you say, "a brush or picker." Your original case does not furnish any sup-

port for the introduction of this alternative. On the 6th page the word "deflector" is used instead of the word "hood," by mistake.

Respectfully, yours,

H. McCORMICK,
For Commissioner.

H. A. BURR,
(Care J. N. McIntire, Washington, D. C.)

Hon. Commissioner of Patents:

SIR: I return herewith the specification (division B) of H. A. Burr's application for the reissue of the Wells extended patent, with an amendment, in compliance with the official letter of the 5th inst.

I remain, sir, yours, respectfully,

CHAS. M. KELLER,
By WM. H. BISHOP.

NEW YORK, *November* 17 1860.

369 A.

I hereby amend the specification of division B, of my application for the reissue of letters patent originally granted to Henry A. Wells, on the 25th of April, 1846, and extended for the further term of seven years, by striking out the word "picker," in the 10th and 13th lines, on page 4, and inserting in lieu thereof, in each of the said places, the words "picking-brush."

B.

Also, on the 5th page, by striking out the word "picker," in the 1st and fifth lines, and substituting in each of the said places the words "picking-brush."

C.

Also, on the same page, on line 17th, by striking out the words "or picker," at the end of the said line.

D.

Also, on page 6th, by striking out the word "picker," in the 2d, 3d, and 7th lines, and inserting in each of the said places the words "picking-brush."

E.

And also, on the said 6th page, by striking out the word "deflector," in the 15th, 22d, and 24th lines, and substituting in each of the said places the word "hood."

F.

And also, on the said 6th page, by striking out the words "and a bell-crank (u^1,)" in the 27th line, and by inserting in the last line, after the letter "v," the words "which cord is attached to a bell-crank u^1."

H. A. BURR,
By his attorney, CHAS. M. KELLER.

NEW YORK, *November* 17, 1860.

370 UNITED STATES PATENT OFFICE,
Washington, Nov. 21*st*, 1860.

SIR: Having examined the application of H. A. Burr, (reissue B,) for improvement in manufacturing hat-bodies, we approve the action of the examiner having charge of the case, and recommend that a patent be allowed accordingly.

Respectfully submitted.

WM. B. TAYLOR,
T. R. PEALE,
Revising Examiners.

Hon. P. F. THOMAS,
Commissioner of Patents.

U. S. PATENT OFFICE, *November* 21*st*, 1860.

The above report is approved, and a patent allowed.

PHILIP F. THOMAS,
Commissioner.

B.

Reissue.—Division No. 1087.

Henry A. Burr, assignee of Eliza Wells, administratrix of H. A. Wells, deceased, of New York, county of New York, State of New York, manufacturer of hat-bodies.

Recorded October 10, 1860. Petition October 10, 1860. Affidavit October 10, 1860. Specification October 10, 1860. 2d. Drawing October 10, 1860. Old patent October 10, 1860. 1. Cert. dep.
371 $15, October 10, 1860. Cash . 2d. Examined November 20, 1860, Vans. Issue, Shugert, November 22, 1860 3d. Patented April 25, 1846. Reissued October 7, 1856—extended seven years. Again reissued December 4, 1860. Recorded vol. 9, page 44.

J. N. McINTIRE,
Washington, D. C.
C. M. KELLER,
New York.

372 A. D. 1850. No. 12955.

Machinery for making hat-bodies and other similar articles.

NEWTON'S SPECIFICATION.

To all to whom these presents shall come: I, William Edward Newton, of the office for patents, 66 Chancery lane, in the county of Middlesex, civil engineer, send greeting.

Whereas her present most excellent Majesty Queen Victoria, by her royal letters patent under the great seal of Great Britain, bearing date at Westminster, the twenty-ninth day of January, in the thirteenth year of her reign, did, for herself, her heirs, and successors, give and grant unto me, the said William Edward Newton, her especial license, full power, sole privilege, and authority, that I, the said William Edward Newton, my executors, administrators, and assigns, and such others as I, the said William Edward Newton, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time, and at all times during the term of years therein mentioned, should and lawfully might make, use, exercise, and vend, within England, Wales, and the town of Berwick-upon-Tweed, and in all her Majesty's colonies and plantations abroad, and in the islands of Jersey, Guernsey, Alderney, Sark, and Man, an invention of "improvements in machinery or apparatus for making hat-bodies and other similar articles," being a communication from abroad; in which said letters patent is contained a proviso obliging me, the said William Edward Newton, by an instrument in writing under my hand and seal, particularly to describe and ascertain the nature of the said invention, and in what manner the same is to be performed, and to cause the same to be enrolled in her Majesty's high court of chancery within six calendar months next and immediately after the date of the said in part recited letters patent, as in and by the same, reference being thereunto had, will more fully and at large appear

Now, know ye that, in compliance with the said proviso, I,
373 the said William Edward Newton, do hereby declare that the nature of the said invention and the manner in which the same is to be performed, is particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon, (that is to say:)

The invention of "improvements in machinery or apparatus for making hat-bodies and other similar articles," which has been communicated to me from abroad, and for which I have obtained letters patent as aforesaid and the manner of making, constructing, and using the same, is shown in the accompanying drawings, in which fig. 1 is a side elevation; fig. 2, a cross section taken at the line x.....x of fig. 1, and looking in the direction of the arrow; fig. 3 is a plan with the former removed; fig. 4 is a logitudinal vertical section taken at the line z....z of fig. 3; fig. 5 is a vertical section of the former, with a bat on it, wrapped around with a felt cloth and covered

with a perforated metal cap, and with a perforated metal shield within the former; and figs. 6 and 7 are separate views of the cap and shield. The same letters of reference indicate corresponding parts in all the figures.

It has long been essayed to make hat-bodies by throwing the fibres of fur, wool, or other similar materials, by means of a brush or picker cylinder on to a perforated former, which must be exhausted by a fan below, so as to carry and hold the fibres on the former by the currents of air that rush from all directions towards and through the apertures of the former to the interior thereof, and thus form a bat of fibres ready for hardening and felting. From various causes, however, all these attempts have hitherto failed. The objects of the improvements hereinafter specified are to remedy the defects which have hitherto prevented the successful use of this mode of procedure. In the machinery for forming the bat, or, as it is termed, "setting up the body," the fur, (or "stock,") after it has been properly picked, is evenly spread upon an endless apron, which presents it to a pair of feed-rollers that feed or supply it to a rotating brush, which, by moving at a great velocity, throws it along a tunnel which is gradually changed in form towards the outlet, where it assumes a shape
374 nearly corresponding to a vertical section passing through the axis of a perforated former placed in front of this aperture or mouth, the said mouth having the effect to direct the fur thrown by the brush on to the former. The tunnel is provided with an aperture immediately under the brush, through which a current of air enters, it being drawn in by the rotation of the brush. This rush of air along the tunnel, assisted as it is by the exhaustion of the perforated former, has the effect of directing the fibres towards the former on which they are deposited and held by the pressure of the atmosphere. As the fibres are only held on the former by the pressure of the surrounding air, which acts thereon in consequence of the exhaustion of air from the interior of the former, it is necessary, before the suspension of this pressure takes place, that some means should be adopted for holding and retaining and consolidating the fibres of which the bat is composed, as it will be obvious that a delicate web thus formed will not have sufficient tenacity to admit of removing it from the former before the hardening process. This is effected by covering the bat, before it is removed from the cone or former, with felted or fulled cloth, and then employing one or two perforated metallic vessels, one to put over the bat after it has been surrounded with the moist felt or cloth, for the purpose of making pressure on the fibres, and to admit of the circulation of hot water when the whole is immersed therein, to harden the bat preparatory to felting; and the other to be placed within the perforated metallic former on which the bat has been formed, and which is necessarily thin and weak. The inner shield is employed for the purpose of resisting the pressure of the surrounding water consequent upon a partial vacuum produced within when the whole is withdrawn from the water.

The first part of this invention consists in the employment of a tunnel of a peculiar construction, into which the fibres of fur are thrown

by the rotating brush, which tunnel guides and directs the fur into an exhausted perforated former placed in front of the delivery aperture thereof, the said funnel or tunnel being made to surround the rotating brush, and provided with an aperture below the brush for the admission of a current of air to aid in directing the fur along the
375 tunnel and on to the former.

The second part of this invention consists in making the sides of this trunk or tunnel of thin sheet metal, or other substance which can be readily and easily bent to the desired form of the aperture or mouth of the trunk, which directs the fur or other material on to the perforated former, can be changed at pleasure, so as to increase or decrease the deposit of fur on any part of the former, as it may be required to increase or decrease the thickness of any part of the bat.

The third part of this invention consists in constructing the top of the tunnel or trunk in such a manner that the end towards the former can be depressed or elevated at pleasure, by means of which the mouth of the trunk or tunnel can be adapted to any size of former, and the top of the trunk made to present an unbroken plane, so as to avoid catching and retaining the fibres, or prevent the formation of eddies in the current of air that passes through the trunk, and which would tend to interrupt the direct passage of the fibres from the brush to the former, the top being so formed as to embrace the pliable sides, so that the upper part of the trunk may always be of the same size, irrespective of the position of the top.

The fourth part of this invention consists in providing the aperture at the back of the tunnel, and below the feed-rollers and brush, with a valve and shutter, for the purpose of closing the aperture, to prevent the passage of a strong current of air through the tunnel at the commencement of each operation, and until the perforated former is covered with a film of fibres, by means of which the formation of welts or air bubbles in the bat are effectually prevented. At the commencement of the operation, and before the perforations in the former are partly closed by the deposit of fibres, it will be obvious that the exhausting fan in the former will produce a much stronger current of air through the trunk than when the perforations are partly closed, and that therefore the fibres will be thrown unevenly and with too great violence on to the former at the commencement of the operation. This, it is found by experience, produces counter-currents,
376 which throw up the first film of fibres from the surface of the former, and thus forms welts or protuberances which are very injurious to the bat; but by closing the aperture at the back of the trunk, the fibres are at first deposited by a gentle current and pressure, and after a film completely surrounds the former, the opening of the valve or shutter will admit the current, so that the fibres may be thrown on with more force to complete the bat.

The fifth part of this invention consists in the employment of one, two, or more rollers, covered with cloth or like substance, below the feed-rollers, the rotation of which, in connection with the brush, has the effect to brush, comb, or otherwise straighten the fibres before they are thrown by the brush and carried to the former.

The sixth part of this invention consists in surrounding the bat on

the perforated former with a felt or felted cloth before the pressure of air is suspended, and then hardening the bat by immersion in hot water whilst on the former, and to give it sufficient consistency to admit of removing it from the former.

And the last part of this invention consists in supporting the bat on the perforated former during the process of hardening by immersion in hot water, by means of a metal cap so perforated as to admit of the free passage of the water to the bat; and this part of the invention also consists in giving support to the inside of the perforated former (when withdrawn from the water) by means of a perforated metallic shield which fits into the inside of the former.

In the accompanying drawings, A represents a frame of the usual or any desired construction, and B an exhausting fan with a chamber, C, over which is placed the perforated former k^{11}, of any desired shape, and which is made of thin metal perforated with fine holes, and placed in front of the mouth or aperture D of the tunnel or trunk E, seen best in fig 2. This tunnel or trunk is carried back to, and is connected with, the case F that surrounds the upper part of the rotary brush G, and the bottom H of the tunnel or trunk is flat, and gradually narrowed from the brush to the mouth; and to the edges of this are properly secured the sides I, I, of the tunnel, which are made of sheet copper sufficiently thin to admit of bending with facility, so that the mouth D can receive any desired shape, and can at any time be changed to regulate the deposit
377 of the fibres on to the former H; for if the sides be bent so as to give the form represented by dotted lines in fig. 2, it will be obvious that the lower part of the bat will receive a greater quantity of fibres in proportion to the middle than if formed as represented by the full lines in the drawing, so that by this means the attendant can alter the shape of the mouth to increase or decrease to any extent desired the deposit of the fibres on to any part of the former, and thus increase or decrease the strength of any desired part of the bat. The curve given to the sides at the mouth D should be gradually run along the sides I towards the back until the curves are lost, so as to prevent any sudden curve along the sides. The top K of this tunnel is made flat like the bottom, and fits within the sides. The back end rests on the top of the case F of the fan; and the forward end, which is wedge-formed, extends a little beyond the sides; and to the end thus projecting are attached bars L, L, which pass along on the outside of the metal sides I, I, (see fig. 1,) and are connected again with the top at the back end, so that the sides being thus embraced between the edges of the top and these bars, when the forward end of the top is depressed or elevated, the flexible or pliable sides follow, so that the upper part of the mouth of the trunk will always present the same size. The top is held at any desired elevation by means of a cord M attached to any part of the frame, or it may be held in any other desired manner. By means of this, the height, size, and form of the mouth may readily be adapted to any size or shape of former, or to the deposit of the fibres required on any part thereof. The back part of the tunnel between the bottom and the lowest of the rollers behind the brush is open for the admission of a current of air to the tunnel and towards

the exhausted former, induced by the exhaustion of the latter and the rotation of the brush. This aperture is provided with a valve or shutter N, (fig. 4,) by which it can be closed or opened at pleasure, for the purpose of shutting off, in whole or in part, the current of air to the tunnel. The axle of this valve is provided with an arm or lever O, (fig. 1,) and a cord P, by which the attendant can retain it in any desired position, and thus regulate the force with which the fibres will be carried to the former. The fibres are fed to the
378 brush from an apron Q, (fig. 4,) by means of two feed-rollers, R, R, covered with cloth; and below these, and in the curve of the brush, are two other similar rollers S, S, also covered with cloth, against which the fibres are brushed by the rotation of the brushes, the surface of these rollers forming a curved bed against which the brush acts, whilst at the same time they continue to hold the fibres for the brush to act on them after they have been liberated by the feed-rollers. One of the feed-rollers receives motion by means of a belt in the usual manner, and drives the others by means of toothed pinions T, T, T, T, on the end of each, as seen in fig. 1. Motion is communicated from any first mover to a shaft A^1, (fig. 1,) on which there is a pulley B^1 from which a belt C^1 passes to a pulley D^1 on the shaft of the fan, whereby the required velocity is given to the fan for exhausting the perforated former. On the shaft A^1 there is a beveled pinion (shown by dots in fig. 1) which gears into another beveled pinion on a shaft E^1. This shaft is furnished at its opposite end with a worm F^1, which works in and drives a worm-wheel G^1 on a vertical shaft H^1, the upper end of which carries, by means of arms I^1, a grooved rim J^1, to which is fitted the lower edge of the perforated former. The said former should be properly fitted to the groove of the rim, so that it may be set in and removed readily, and yet as near as possible make an air-tight joint. The rotating fan and feed-rollers are driven by belts K^1 and C^1, which pass around the pulleys on the main or other shaft. It will be obvious that the parts may be operated by cog-wheels, or any other suitable arrangement of machinery known to machinists; and it will also be obvious that other suitable flexible substances may be substituted for copper in making the sides of the tunnel or trunk, as any substance that can be readily bent, and which, when bent, will retain the form given to it, will answer as a substitute for the sheets of copper. In operating the machine, the fur or other fibres, after being properly picked, are to be evenly spread upon the endless apron Q, which gradually supplies them to the feed-rollers R, R, which carry and present them to the rotating brush G, which, after brushing them on the surface of the rollers S, S, covered with cloth, throws them along the tunnel towards the delivery
379 aperture. The sides of the tunnel guide and direct them on to the surface of the perforated former, which being exhausted receives the fibres on its surface, where they are held by the pressure of the atmosphere. and as the former rotates slowly, the fibres are eventually deposited upon every part of its surface until the required thickness has been obtained. At the commencement of the operation the valve or shutter n, fig. 4, in the aperture below the *the* brush g, must be closed, in order that the current that carries the fibres on to

the former may be gentle ; and when a film of fibres has been formed on the former, the valve must be gradually opened, so as to increase the current and deposit the fibres with more force. If this precaution be not attended to, welts or protuberances will be formed in the bat which will render the bat defective. So soon as the required thickness of bat has been obtained, it is to be surrounded with a moist felt or fulled cloth, for the purpose of retaining it on the former, and this must be done before the pressure of air is taken off.

The mode of effecting this object, which has been practiced with the most success, is to take a top piece to cover the top, and then take a strip of the said felt or fulled cloth, rolled on a wooden roller, and applied against the bat, and as the former rotates, the cloth will wind off the roller and on to the bat. The former is then taken from the machine and another former put on, so that another bat may be made during the hardening process.

A metal cap, k^{111}, fig. 5, and shown separately at fig. 6, is perforated with large holes, and being made a little larger than the former, is put on over the felt covering, and a similar perforated metal case, l^1, called a shield, and shown detached at fig. 7, is inserted within the former, and then the whole, as shown in section at fig. 5, is immersed in hot water to harden the bat. The holes in the cap and shield admit the water freely to the bat, whilst at the same time the cap prevents the fibres of the bat from being disturbed by the water, and the shield prevents the former from being collapsed by the pressure when the whole is being drawn out of the water. After immersion in hot water the bat will be sufficiently hardened to admit of removing it from the former.

380 Having now described the invention that has been communicated to me as aforesaid, I would observe, in conclusion, that although I have described the best means with which I am at present acquainted, for carrying the improvements into effect, I do not mean or intend to confine myself rigidly to the precise arrangement or construction of parts herein shown and described, as they may perhaps be varied without departing from the nature and object of the present improvements ; but that which I consider to be new, and therefore wish to claim as the invention secured to me by the hereinbefore in part recited letters patent, is—

First. The employment of the rotating brush in combination with the tunnel and an exhausted perforated former, placed in front of the delivery aperture of the said tunnel.

Second. Making the top of the tunnel for directing the deposit of the fibres on to the exhausted former adjustable, and constructing the sides thereof of thin sheet metal, or other suitable flexible material which can be readily bent, and which will retain the form given to it, so as to admit of changing the form and dimensions of the delivery aperture of the tunnel when it is desired to vary the thickness of the various parts of the bat to be produced.

Third. The employment of the valve or shutter, N, for the purpose of regulating the supply of air which enters and passes along the tunnel, and directs the fibres on to the exhausted former, as described.

Fourth. Combining with the rotating brush and feed-rollers one,

two, or more rollers, covered with cloth or other suitable substance, for the purpose of holding the fibres whilst being acted upon by the brush, as described.

In witness whereof, I, the said William Edward Newton, have hereunto set my hand and seal this twenty-ninth day of July, in the year of our Lord one thousand eight hundred and fifty.

W. E. NEWTON. [L. S.]

381 And be it remembered that on the twenty-ninth day of July, in the year of our Lord 1850, the aforesaid William Edward Newton came before our said lady the Queen, in her chancery, and acknowledged the specification aforesaid, and all and everything therein contained and specified, in form above written. And also the specification aforesaid was stamped according to the tenor of the statute made for that purpose.

Enrolled the twenty-ninth day of July, in the year of our Lord one thousand eight hundred and fifty.

MOWBRAY.

382 *The United States Patent Office to all persons to whom these presents shall come, greeting:*

This is to certify that the annexed is a true copy from the record of this office of letters patent, issued to Hezekiah S. Miller, March 5th, 1839.

In testimony whereof, I, S. T. Shugert, Acting Commissioner of [L. S.] Patents, have caused the seal of the Patent Office to be hereunto affixed this twenty-third day of March, in the year of our Lord one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-fifth.

S. T. SHUGERT.

No. 1094.

The United States of America to all to whom these letters patent shall come:

Whereas Hezekiah S. Miller, of Philadelphia, Pa., has alleged that he has invented a new and useful improvement in the machine for making felt in the manufacture of fur hats, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Hezekiah S. Miller, his heirs, administrators, or assigns, for the term of fourteen years from the fifth day of March, one thousand eight hundred

and thirty-nine, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said
383 Hezekiah S. Miller, in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand, at the city of Washington, this fifth day of [L. S.] March, in the year of our Lord one thousand eight hundred and thirty-nine, and of the independence of the United States of America the sixty-third.

JOHN FORSYTH,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.
HENRY L. ELLSWORTH,
Commissioner of Patents.

The schedule referred to in these letters patent and making part of the same.

To all whom it may concern:

Be it known that I, Hezekiah S. Miller, of the county of Philadelphia, in the State of Pennsylvania, have invented a new and useful improvement in the manufacture of hat-bodies from fur, and I declare the following to be a full and exact description and specification thereof.

The nature of my invention consists in a method by which fur, after being carded, picked, or blown, is converted into a continuous web, lap, or sheet, for the purpose of being wound into hat-bodies, so as to attain advantageously with fur the same end which has been heretofore attained in relation to wool. This is done by the following process, namely:

A revolving fan or blower, having four or more floats or wings, and of length to correspond with a carding-machine, picker, or blowing-machine, receives the fur from the doffer of a carding-machine, or from a picker, or from a blowing-machine, such as is known among hatters and used for cleansing the hair from fur, and blows it through a
384 passage, oblong box, or spout, until it reaches a cylinder of which the surface is composed of sieve-work, wire gauze, millinet, or other similar open substance, so as to admit through it the air received with the fur from the revolving fan aforesaid. This gauze cylinder is in constant motion, so that the fur received from the fan through the said passage is made to pass through between the said gauze cylinder and a friction roller, and is compressed between them into a web, film, or sheet of fur. The web or lap so formed then follows a small distance on the surface of the said gauze cylinder until it reaches a revolving apron or endless sheet of leather or other suitable material, when it is again compressed between said apron and the gauze cylinder, the pressure being assisted by a second roller placed within the said apron or endless sheet. The web or sheet of

fur then continues to advance upon the surface of the said apron, until it reaches another similar apron placed over the first mentioned, and is there between the two aprons compressed a third time, the compression being assisted by rollers placed within each apron.

The web or sheet of fur is now perfected so that it may be wound into hat-bodies upon a roller of the customary or proper form, in the same manner, well-known to hatters, which has heretofore been practised for winding a web or sheet of wool for the same purpose.

In the annexed drawing, figure 1 represents a perspective view, and figure 2 a vertical section of the apparatus which I employ in the process above described, while fig. 3 represents a suggested variation in the form of the before-mentioned gauze cylinder.

A, figure 1, and A, figure 2, represents the revolving fan or blower which first receives the fur from the doffer of the carding-machine, etc. B B B B, figure 2, are the four floats or wings of the fan A. C, figure 1, is the cover to the said fan, which cover may be of wood or other material, and the floats of the fans may be of wood, metal, or other suitable substance.

D, fig. 1, is the band by which the fan (A) is driven; E, fig. 1, and E, fig. 2, is the place where the doffer of the carding-machine fits underneath the fan of the lapping or web-forming machine, (which
385 latter is my invention.) F F, fig. 1, and F F, fig. 2, is the oblong box, passage, or spout, through which the fur is driven by the fan (A). It may be made of wood or other material, in breadth proportioned the carding-machine, (or picker, etc.,) in thickness or vertical diameter about ten inches at the upper and twelve inches at the lower end, and in length about six feet, or of such other size and proportions as may be found expedient. G, fig. 1, and G, fig. 2, is the cylinder of wire gauze, (etc.,) which constitutes an important portion of my improvement. H H, fig. 1, and H H, fig. 3, is the sievework, wire gauze, or other open work, of which the surface of the cylinder G is composed. The form of the cylinder in fig. 1 is straight or of uniform diameter, while that in fig. 3 is swelled in the middle, approaching that of a double cone. The form represented in fig. 3 may be used, if desired, for the purpose of increasing the thickness of the central part of the web or lap of fur, so as to give more substance or thickness to the rims of the hats, two hat-bodies being made from one web, as is customary. I I I, fig. 1, and I I I I, fig. 2, are bores or holes through the ends of the gauze cylinder, made for facilitating the escape of the air which is received into the cylinder from the fan A. K, fig. 1, is the pulley by which the gauze cylinder (G) is driven, the band being also seen in the drawing. L, fig. 2, is the roller by which the fur is first compressed into a web between it and the gauze cylinder G. M, fig. 2, is the roller which next aids in compressing the web between the gauze cylinder and principal apron, and N, fig. 2, is the third compressing roller which aids to compress the web between the principal and lesser apron or revolving sheet. O and P, fig. 2, are the two rollers on which the principal apron revolves, and Q and R, fig. 2, are the two rollers over which the smaller or secondary apron revolves. S S, fig. 1, is the principal apron, and T T, fig. 1, is the secondary or upper apron—the edges

of these aprons are also seen in section at S and T, fig. 2. The secondary apron T T has a frame for its rollers, Q R, so constructed that the frame, the rollers, and the apron together, are capable of reciprocating lateral or side motion. This lateral reciprocating motion is communicated through the rod U U, fig. 1, which rod is moved back and forth by a crank or eccentric connecting its outer end with
386 the upper end of the shaft which is moved with the pulley V, fig. 1, as seen in the drawing. The contemplated advantage of this reciprocating lateral motion of the upper apron is the more fully to press and mat together the web or lap of fur. W, fig. 1, is the pulley which drives the roller O, fig. 2, and puts the principal apron in motion, and X, fig 1, is the band coming from the pulley on the further end of the cylinder G, and putting in motion the roller (R, fig. 2,) so as to make the upper apron revolve. Y Y Y Y, fig. 2, is the lap or sheet of fur, the edge of which is seen in section proceeding from the gauze cylinder along the surface of the principal apron and descending to the floor. The manner of winding this sheet into hat-bodies on a double cone or cylinder is the same which is used for making wool hats. It is not exhibited in the drawing, because it is well known to those in the trade, and constitutes no part of my improvement.

What I claim as my invention, and desire to secure by letters patent, is, first, the combination of the fan, oblong box, or spout, and cylinder, for the purpose and in the manner herein described.

And, second, the combination of the two aprons operating for the purpose and in the manner herein described; and also these in combination with the combined fan, spout, and cylinder, as herein described.

HEZEKIAH S. MILLER.

Witnesses:
THOMAS EARLE.
M. Y. BRYANT.

387 *Defendants' Exhibit No.* 11.

No. 538.

The United States of America to all to whom these letters patent shall come:

Whereas William Fosket, of Meriden, Conn., has alleged that he has invented a new and useful improvement in machinery for making hat-bodies, (for which letters patent were issued to him dated January 23d, 1846, which letters having been surrendered by him, the same have been canceled and new letters ordered to issue to him on an amended specification,) which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of fifteen dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive

property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said William Fosket, his heirs, administrators, or assigns, for the term of fourteen years from the twenty-third day of January, one thousand eight hundred and forty-six, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said William Fosket in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto
[L. S.] affixed.

Given under my hand, at the city of Washington, this
388 twenty-third day of March, in the year of our Lord one thousand eight hundred and fifty-eight, and of the independence of the United States of America the eighty-second.

JACOB THOMPSON,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

J. HOLT,
Commissioner of Patents.

The schedule referred to in these letters patent and making out part of the same.

To all whom it may concern:

Be it known that I, William Fosket, of Meriden, in the county of New Haven and State of Connecticut, formerly of Ware, in the county of Hampshire and State of Massachusetts, have invented certain new and useful improvements in manufacturing hat-bodies, and that the following is a full, clear, and exact description of my said invention, reference being had to the accompanying drawings, in which—

Figure 1 represents a top view of my machine with the cover of the wind-case removed to permit the interior thereof to be seen; and

Figure 2 represents a vertical longitudinal section of the machine.

Hat-bodies have for many years been manufactured by a hand process. In this process the fibres of fur, or other material employed, are picked apart and projected into the air by the hatter's bow operated by the workman, and are caused to deposit upon the workman's table, or hurdle as it is called, in the form of a flat bat, whose shape, size, and thickness at different parts are determined by the workman. The bats thus formed are made up by hand into hat-bodies, whose relative thickness at different parts depends upon the thickness of the bats, which is varied as required by the workman who makes them. This mode of manufacture is objectionable on account of its tediousness, and on account of the great amount of labor and skill required in the operatives; hence various machines have been devised for manufacturing hat-bodies upon
389 the general mode of operation, of disintegrating a fibrous material and disseminating its fibres in air by means of a mechanical

picking apparatus, and of collecting the picked fibres in the form of a bat upon a pervious exhausted surface sufficiently open to permit air to pass through it, but close enough to retain the fibres upon it. These machines may be divided into two great classes, namely: that class in which the fibres are collected upon a pervious exhausted surface in the form of a flat bat or web, which is afterwards made into a hat-body by winding it upon a former of the proper size and shape; and that class in which the fibres are collected upon a pervious exhausted former of the size and shape of the hat-body to be made. In both instances the hat-bodies are hardened after they are formed. The mode of manufacture pursued with machines of the first class is objectionable, principally because it is indirect, and because it requires much machinery, labor, and experience. The mode of manufacture pursued with machines of the second class is also objectionable, principally because no method has hitherto been devised by which the distribution of the fibrous material in the hat-body, so as to obtain a hat-body having the ——— variation in thickness at its different parts, required by the trade and obtained by the hand process, can be obtained automatically.

My invention relates particularly to the ——— manufacture of hat-bodies with machines of the second class, and it is to produce, by a direct process, hat-bodies in which the requisite distribution of the fur fibres is effected automatically, so that the labor of boys or of persons unskilled in the manipulation of the hatter's bow can be substituted for that of skillful hatters. In the mode of operation pursued by me, the hat-bodies are formed directly upon a reticulated or perforated former, of the shape and size of the hat-body to be produced, by causing picked fur fibres to impinge against its surface, and to be held there until the operation is completed, and the distribution of fibres in the hat-body, or the regulation of its thickness, is effected automatically, by supplying a larger quantity of picked fibres to the parts of the former, which correspond with the brim of the hat and lower portion of the crown or position of the band, than to the other parts of the former. In the machinery which I have devised for this
390 purpose for forming conical hat-bodies, the fur is picked apart, and its fibres are projected into an inclosed passage or conductor by a mechanical picking apparatus; they are conducted by this inclosed passage to a rotating perforated conical former, from the interior of which air is exhausted by a centrifugal fan; the inclosed passage or conductor has openings in it, through which currents of air enter to supply the exhaust, and these openings are situated in such positions that the currents of air entering through them act upon the fur fibres proceeding from the picking apparatus, and impel them towards the conical former. The fur fibres proceeding towards the conical former impinge thereupon, and are held there by the pressure of the air.

The picker is situated opposite a section of the lower part of the cone, and the current of impelled fur projected by it into the conductor is broad as it leaves the picker, and has then but little hight or thickness, while the hight of the conical former, which stands erect, is many times greater than the hight or thickness of the current of

fur as it leaves the picker; hence the current of impelled fur tends to impinge against the lower part of the conical former, and to deposit thereupon, in a band or belt, as the conical former is rotated to turn in succession the different parts of its surface towards the current of impelled fur. This tendency of the fur to deposit in a belt or band at the lower part of the conical former is modified, by deflecting a portion of the impelled current of fur upwards from its direct course, as it proceeds from the picking apparatus, thus causing a part of the fur to impinge against the upper portion of the conical former, while the larger part impinges against the lower portion thereof, so that as the cone is turned to present in succession every portion of its surface to the current of impelled fur, the latter is supplied in larger quantities towards the base of the conical former than towards the tip thereof, whereby a bat is produced, in which the fur is distributed in the required manner.

The mode of operation thus described is sufficient to produce a conical bat of fur fibres, in which the latter are distributed in the required manner, but the texture of the mass is too loose to permit it to be handled without injury when the cone is removed from the exhaust; hence I subject the bat, while on the cone on which it
391 is formed, to a hardening process. The hardening is effected by means of conical rollers, which press upon the bat as the cone revolves, and compact it sufficiently to enable the cone, with the bat upon it, to be removed from the exhaust, so that the bat may be got ready for the after and well-known process of sizing by felting.

In machines for manufacturing hat-bodies it has been customary to employ toothed pickers of various constructions, for the purpose of disintegrating the fibrous material and disseminating the fibres in air. Such pickers are advantageous on account of the rapidity with which they do their work, but their employment has been objected to by hatters as tending to injure the material, and as disadvantageous in this respect when compared with the hatter's bow.

In order, therefore, to enable me to pick the material in cases in which it is desirable to produce hat-bodies of the best quality, I have deemed it expedient to use in my machine a picker consisting of a bow-string, and an instrument to cause the same to vibrate by mechanical means, which is used in connection with a suitable feeding and nipping apparatus, so as to operate upon the material in a manner analagous to a hatter's bow.

The machinery represented in the accompanying drawing exemplifies my invention; in it the fibrous material of which the bat is to be fabricated is placed in sufficient quantities upon an endless feeding-cloth or apron A, which rests and moves upon or over the upper surface of a suitable table B, and is caused to revolve by passing around a roller C, which is arranged in front of the table, and operated by any proper means. Just above that portion of the feeding-cloth which rests upon the upper surface of the roller C, a spring guide-plate D is arranged so as to rest in contact or nearly so with the feeding-cloth; the said guide-plate being supported in position by suitable springs E E, or other contrivances of like nature, which permit it to rise above the cloth to the degree required to permit the passage of the fibrous

material into the machine and at the same time to hold it to allow the proper action of a bow-string E stretched in front of the guide-plate and upon the tops of spring-posts G G. A suitable passage or tube H leads from the vicinity of the bow-string to what may be
392 termed as the forming or wind-chamber I, this latter being a square or circular box of convenient dimensions, around and through the lower part of each of the sides of which various elongated orifices K are each to permit the external atmosphere to have access to the interior of the chamber. Upon the central part of the bottom of the chamber a conical frame L of wire is raised, the same being of the size necessary for the formation of the hat-body. This frame is covered on the outside with muslin or fine wire gauze or other suitable material of similar character, and while in operation it should have a continued slow rotary movement in a horizontal direction imparted to it by a band R operating around a pulley S applied to the said frame, as seen in fig. 2. By giving to the conical gauze frame a rotary motion, the deposition of the fibres will be more evenly formed upon it than it would if it were stationary. That part of the bottom of the wind-chamber situated within the gauze frame opens by one or more suitable passages M, fig. 2, into a box or pipe or chamber N, which leads to a fan-blower or wind-wheel O, placed in any convenient position and revolved by any proper mechanism applied to it. The bow-string is operated by means of a wheel P arranged under the same, and having a series of teeth Q Q extending from its circumference, and which come in contact with the string as the wheel is revolved, and produces the whipping or bow-string operation upon the fibrous material, similar to that usually effected by hand process in bowing.

The machinery being put in motion, the fan-blower or wheel draws a powerful current of air through the orifices K and tube H and into the wind-chamber, from whence it rushes through the meshes of the conical frame, and is received into the case R surrounding the fan-wheel O, and finally discharged therefrom by the action of the said wheel. The filaments of the fibrous material, separated from each other and projected by the bow-string, are carried along with the current of air which enters through the tube H into the wind-chamber and towards the gauze frame, upon which they pile or overlay each other, and upon which they are to be pressed and upon each other by revolving conical rollers or other proper contrivances. The process
393 is thus carried on until a sufficient quantity of the fibrous material to form the hat-body is deposited upon the conical gauze frame, from which it is afterwards to be removed and felted or treated in the usual manner.

In the operation of the machinery thus described, the current of fur impelled along the conductor formed by the tube H and chamber I, by the combined action of the picker and the current of air entering the conductor at the picker, proceeds toward the section of the lower part of the conical former which is opposite the picking apparatus.

In its passage to this portion of the conical former it is acted upon by the currents of air which enter the conductor through the orifices K at its bottom, and set toward the surface of the conical former,

towards its tip as well as towards its base; such of these currents as set towards the upper portion of the conical former deflect the fur fibres upwards, thus wafting a portion towards the tip of the conical former, while the larger portion pursues its direct course towards the lower part thereof. This deflection of the current upwards is furthered by the unequal obstruction of the openings or perforations in the conical former by the accumulation of fur fibres. As the operation proceeds, the fur fibres accumulate more rapidly, from the above-mentioned causes, upon the lower portion of the conical former than upon its upper portion; hence the currents of air passing towards and through its lower portion grow weak faster than those which pass towards and through its upper portion, and thus the proportion of fibres supplied to the upper portion of the conical former is greater towards the close of the operation than at its commencement.

The relative quantities of fur fibres which are thus supplied to different portions of the former depend upon the form and dimensions of the conductor, and upon the extent and position of the openings by which the currents of air are admitted to it. In the machine I have described as exemplifying my invention the conductor entirely surrounds the former, and in this case it is necessary to admit currents of air at all sides of its bottom as well as at the picker, so as to waft upwards the fibres of fur, which, if there was but the one opening at the picker to admit the currents of air, would deposit in greater or less quantities upon those parts of the bottom of the conductor
394 which were not swept over by the currents proceeding from that one opening to the former.

The invention which I have described is not of necessity limited to machinery of the precise form and construction represented in the drawing, as these may be varied without affecting the principle of my invention, to meet the views of different manufacturers.

Having thus described my improvement in the manufacture of hat-bodies, I deem it proper to state that I am aware the mechanical pickers of various constructions have been used, in connection with pervious surfaces and exhausting fans, in the manufacture of hat-bodies, and therefore do not claim such devices separately or in their pre-existing combination, as my invention; but

What I claim as my invention, and desire to secure by letters patent, is the herein-described automatic method of forming hat-bodies having the required variation in thickness at their different parts, by supplying picked fibres to an exhausted former of the size and shape required, in such manner that a larger portion of picked fibres is supplied to that part of the former which corresponds with the thickest portion of the hat-body, and a less portion to the other parts of the former, substantially as herein set forth.

I also claim the combination of a picking apparatus, a hat-body former, an air exhausting apparatus, and a conductor, the whole combined substantially as herein set forth.

I also claim a bow-string picking apparatus, constructed and

operating substantially as herein set forth, to pick fur presented to it by a suitable feeding and nipping apparatus.

In testimony whereof, I have hereunto subscribed my name.

WM. FOSKET.

Witnesses:

EDWIN HUBBARD

S. B. PARMELEE.

395 DEFENDANTS' EXHIBIT No. 12.

The United States of America to all to whom these letters patent shall come:

Whereas Stephen Hurlbut, a citizen of the United States, hath alleged that he has invented a new and useful improvement in the manufacture of hats by hardening the body on the cone, which improvement he states has not been known or used before his application; hath made oath that he does verily believe that he is the true inventor or discoverer of the said improvement; hath paid into the treasury of the United States the sum of thirty dollars, delivered a receipt for the same, and presented a petition to the Secretary of State signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose: These are therefore to grant, according to law, to the said Stephen Hurlbut, his heirs, administrators or assigns, for the term of fourteen years from the thirteenth day of June, one thousand eight hundred and thirty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Stephen Hurlbut himself in the schedule hereto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the United States to be hereunto affixed.

Given under my hand, at the city of Washington, this thir-
[L. S.] teenth day of June, in the year of our Lord one thousand eight hundred and thirty-one, and of the independence of the United States of America the fifty-fifth.

ANDREW JACKSON.

By the President:

EDW. LIVINGSTON,
Secretary of State.

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CITY OF WASHINGTON, *to wit:*

I do hereby certify that the foregoing letters patent were delivered to me on the thirteenth day of June, in the year of our Lord one thousand eight hundred and thirty-one, to be examined; that I have examined the same, and find them conformable to law; and I do hereby return the same to the Secretary of State within fifteen days from the date aforesaid, to wit, on this thirteenth day of June, in the year aforesaid.

JNO. MACPHEARSON BERRIEN,
Attorney General of the United States.

Stephen Hurlbut.—Letters patent, June 13, 1831.

The schedule referred to in these letters patent, and making part of the same, containing a description in the words of the said Stephen Hurlbut himself, of his improvement in the manufacture of hats by hardening the body on the cone.

To all to whom these presents shall come:

Be it known that I, Stephen Hurlbut, of Glastenbury, in the county of Hartford and State of Connecticut, have invented a new and useful improvement in the manufacture of hats by hardening the body on a cone, and that the following is a full and exact description of the construction and operation of the said machine, as invented or improved by me.

My claim is for admitting steam into the cone on which hat-bodies are formed; also, for covering the cone with a cap or shell. The cone No. 2, on which the hat-body is formed, is perforated with holes; when the web which constitutes the body is wound upon the cone, it is covered with a cloth, and over the whole is put the cap No. 4. It is then taken to the bench No. 1, and placed directly on the steam-pipe No. 3, and the cap No. 4 is set in motion by the crank No. 7. This process will harden the hat-body.

STEPHEN HURLBUT.

Witnesses: SAMUEL WELLES.
GIDEON WELLES.

397 *Defendants' Exhibit No.* 13.

R[5] 387.

Whereas I, William Fosket, of Meriden, in the State of Connecticut, did obtain letters patent of the United States for a certain new and useful improvement in machinery for making hat-bodies, which letters patent were granted on the 23d of January, 1846, and reissued on an amended specification on the 23d day of March, 1858; and

Whereas the said reissued letters patent were extended for a further term of seven years from the 23d day of January, 1860; and

Whereas Henry A. Burr, of the city, county, and State of New York, is desirous of acquiring all my right, title, and interest in and to the said extended term of the said patent:

Now, this indenture witnesseth that, for and in consideration of the sum of one dollar to me in hand paid, and certain other valuable considerations, the receipt whereof is hereby acknowledged, I, the said William Fosket, have assigned, sold, transferred, and set over, and do by these presents assign, sell, transfer, and set over, unto the said Henry A. Burr, all my right, title, and interest in and to the said extended term of the said letters patent.

The same to be held and enjoyed by the said Henry A. Burr, for his own use and behoof, and for the use and behoof of his legal representatives, as fully and entirely as the same might have been held and enjoyed by me had this assignment and sale not been made.

In testimony whereof, I have hereunto set my hand and seal this 26th day of January, 1860.

[L. S.] WILLIAM FOSKET.

In presence of—

ANDREW DE LACEY.

WILLIAM H. BISHOP.

Received and recorded April 26th, 1860.

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399 *Defendants' testimony.*

UNITED STATES OF AMERICA,

Southern District of New York,

City, County, and State of New York, ss:

Be it remembered that on this eighteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States,'" passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States court buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, John J. Till, to testify and the truth to say, on the part and behalf of the defendants in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits; and the said John J. Till being about the age of thirty-four years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said John J. Till, and he did thereupon depose, testify, and say as follows, namely:

Q. 1. What is your name, age, residence, and occupation?

A. John J. Till; 34 years of age; 91 Commerce street, Newark, N. J.; occupation, hatter.

Q. 2. Have you been in the employ of the defendants; and if so, how long and in what capacity?

400 A. I have been in their employ seventeen years; I have had charge of the forming department since 1849; I mean including all the branches of the working departments—forming, making, etc.

Q. 3. During the time that you have been in the employ of the de-

fendants, how many Burr machines have they used at any one time?

A. Two machines.

Q. 4. On the Burr machines, for whom have hat-bodies been formed?

A. Been formed for the concern, for the company inside; I mean by company, the defendants.

Q. 5. Have you or not ever known more than two Burr machines to be used at one time?

A. No, sir.

Q. 6. Have you or not known of hat-bodies being made on the Burr machines for any person other than the defendants?

A. I never did.

Q. 7. In whose charge were the machines for forming hat-bodies at the defendants?

A. I had the supervision of the forming, and knew what was formed.

Q. 8. Had you knowledge of a machine which was put up in Mr. Boyden's room in the spring of 1859?

A. Yes, sir.

Q. 9. What was the construction of that machine, and what was done with it? State wherein that machine differed from the Burr machine, or agreed with the Burr machine.

(Objected to because it does not appear that the witness is qualified to answer the question as an expert, and the question calls for such an answer.)

A. Different from the Burr machine; had no trunk on; perfectly naked from the brush. After this experiment was tried it was taken back where it came from, and there it remains in the same room.

Q. 10. Where was it brought from and returned to?

A. Brought from the fifth story above, room above, in the garret, and was returned there.

Q. 11. That garret was a rubbish room?

401 A. Yes, sir.

Q. 12. What experiment was tried with the machine which you allude to, and with what result?

A. Well, the experiment was tried to form a hat; we found it wouldn't answer. The machine was taken down after that, and carried in the above-mentioned place.

Q. 13. Did you experience any inconvenience in the use of the Burr machines in the forming room, by reason of their being out of order, or badly constructed?

(Objected to, as leading and argumentative.)

A. Question withdrawn.

Q. 14. Did you experience any inconvenience in the use of the Burr machines; and if so, from what cause?

A. We experienced in one of the machines; was built in a very irregular manner, not built in proportion to work well; the running gear, that is, the shafts through them, was too light for the platform; it kept getting out of order at various times.

Q. 15. In what way did this inconvenience you?

A. Well, the cogs were too light in proportion ; it got out of order, the cogs would become worn away in a short time, and the platform kept a jiggling, so it was hard work to keep the cone on.

Q. 16. What did you do to get through with your work in forming hat-bodies?

A. We had to run nights, at various times to get hats enough.

Q. 17. Why were you compelled to run at night?

A. My answer on that would be, on account of this machine getting out of order.

Q. 18. Whose construction was this machine which got out of order?

A. Mr. Burr's machine.

Q. 19. From whose factory did it come?

A. Mr. Burr's.

Q. 20. Did you make complaint about this machine?

(Objected to as leading.)

A. I did.

Q. 21. Who worked on that machine in Mr. Boyden's room while the experiment was tried?

402 A. John W. Seaver.

Q. 22. Was there any part of a Burr machine used in the construction of that machine; and if so, mention what those parts were, and whether the parts were old or new. I mean the machine in the Boyden room, on which the experiment was tried?

A. The running gears, that is, the frame and the brush on, and one of the old man's fans, (Mr. Boyden's.) The parts were old.

Q. 23. Was there or not any other machine in the Boyden room constructed out of any old portions of a Burr machine at any time?

A. No, sir.

Cross-examined by Mr. Gifford, counsel for complainant.

X. 24. Why was that room called the Boyden room?

A. That was simply because Mr. Boyden's shop was up there where he had his machines—where he was experimenting at his machines.

X. 25. Who was Mr. Boyden working for in that shop?

A. Well, I don't know as I can hardly answer that question—not positively. I suppose he was working for Mr. Jaques.

X. 26. Do you mean for Mr. Jaques individually, or for the defendants, Duryee, Jaques & Co.?

A. I mean Mr. Jaques.

X. 27. Why do you think he was working for Mr. Jaques individually, instead of for the firm?

A. Well, I don't know as I could say positively; I think he was working for Mr. Jaques. Mr. Jaques, as far as I know, had more access with Mr. Boyden.

X. 28. Was not Mr. Jaques, and is he not now, the most active member of his firm in the manufacturing department of their business?

A. Yes, sir ; he was and is.

X. 29. When did Mr. Boyden commence to work in the defendants' factory?

A. I think it was along in 1858; I won't be positive.

X. 30. What was Mr. Boyden at work at there?

A. Well, he was building his machines, trying experiments at his machines.

403 X. 31. What was he experimenting for?

A. Trying to build a machine to form hats.

X. 32. Was he trying to build one covered by Mr. Burr's patent, or one which was not covered by it?

(Objected to.)

A. Well, he was trying to build a machine not to infringe on Mr. Burr.

X. 33. What was that Boyden room used for before Mr. Boyden commenced in it?

A. It was used for a wool-picking room.

X. 34. What was done to the room, or in the room, to prepare it for Mr. Boyden, if anything?

A. Well, the room was partitioned off from the outside staircase. Benches simply to harden on were made.

X. 35. Was that a private room after Mr. Boyden commenced to work in it?

A. It might have been on the start, commencement; but after the old man Boyden had a few hats formed the door was never locked.

X. 36. Is Mr. Boyden considered an ingenious mechanic?

A. He is considered so.

X. 37. Is he an inventor of other things than matters about hat-body machines?

A. Well, I presume he is.

X. 38. You say that Mr. Jaques had more access to Mr. Boyden than any other members of the firm; explain what you mean by that?

A. Well, Mr. Jaques is in the factory more than the rest of the firm; I mean that Mr. Jaques sees Mr. Boyden oftener.

X. 39. Your previous answer was, that Mr. Jaques *had* more access with Mr. Boyden; and the last question asks you to explain what you meant by that, and your last answer speaks only of the present time, saying, Mr. Jaques *sees* him oftener; please explain further.

A. My explanation on that is, that Mr. Jaques, since Mr. Boyden has been there, has had more access than any other of the firm.

X. 40. Do you mean that Mr. Jaques was often in the Boyden room, or that he has had more access to Mr. Boyden out of the room?

404 A. I should answer that, in the room.

X. 41. Were there any hat-body machines in operation at the defendants' factory when you commenced to work for them?

A. There was not.

X. 42. How soon, after you commenced to work for them, were hat-body machines put in operation in that factory?

A. I think it was four years; it might have been five years; I am not certain as to the exact time.

X. 43. Was there more than one machine started at first?

A. No, sir.

X. 44. Where did that first machine come from, and who put it up?

A. It came from Mr. Burr, from New York. I could not say positively whether it came from New York. The man that put it up, I don't remember his name, but he got killed at the Hague street explosion; I was quite familiar with the man, but I cannot remember his name.

X. 45. For whom did that man work at the time that first machine was put up, and in whose factory was the explosion that you speak of?

A. I supposed he was working for Mr. Burr. The factory that got blown up, I suppose, was Mr. Burr's; I am not positive.

X. 46. How soon after that first machine was put in operation in the defendants' factory was there a second one put in operation there?

A. Well, it might have been one or two years; I couldn't say positive; it might have been three.

X. 47. Where did that second machine come from, and who put it up?

A. I suppose it came from the same place, Mr. Burr's. I think it was a man by the name of Hardy put it up; I forget his first name.

X. 48. Was his first name Michael?

A. I couldn't say positive, but it sounds like his name.

X. 49. Were those two machines in operation in 1849, when you took charge of the forming?

A. This question gives me light; I can now answer more
405 fully the cross-question 46; there was not two years difference in putting up the first and second machines, if there was that; I think they was both in operation.

X. 50. Were they then in the same room in which they were both put in operation, and were they both in one room?

A. They were both put up together in one room, and when I took charge they were still in the same room.

X. 51. How long did they both continue to run in that room?

A. Well, I think it was between two and three years.

X. 52. What then took place as to both or either of them?

A. They was taken from that room into where they now lay or stand.

X. 53. Is either of those first two machines now in operation in the defendants' factory?

A. Well, I don't think there is one of them in there standing; the ones we have now are different.

X. 54. Was not one of those first two machines sent back to Mr. Burr?

A. I think they were both sent back; one I am positive of; I remember seeing it packed.

X. 55. Was a new machine received from Mr. Burr's in place of that one which was sent back to him?

A. There was.

X. 56. About what date was the exchange made?

A. Well, I couldn't say correctly the date; it might have been 1852 or '3; I can't swear positive to the dates.

X. 57. Do you know who put up the new machine which was substituted for the old one which was sent back?

A. I don't know as I could say positive.

X. 58. Where was he from?

A. I suppose from Mr. Burr's place.

X. 59. During your employment for the defendants, did they not move from the old to a new shop; and if yea what time was it?

Q. Well, I couldn't say what time it was; it might have been 1852 or 1853; somewhere along there. They did move.

X. 60. Were the Burr machines moved at that time?

A. They were.

406 X. 61. Were they moved from the room where they were first put in operation?

A. They was.

X. 62. Explain what room that was from which they were removed?

A. Well, it is the room where the engine now is, in the basement; it's on the west side of the front building.

X. 63. Describe the room to which the Burr machines were moved to at that time?

A. Well, it is a building nearly opposite, more north; the room is in the basement of this new building; the first two machines that were put up nearest the centre, a little south of the center.

X. 64. Was there another put up after putting up those two in that place?

A. Yes, sir.

X. 65. How many?

A. I think there were two.

X. 66. Were either of those two put up while the first two were there?

A. I think the third machine, when it was put up, we took the second machine down.

X. 67. Was there at any time as many as three of those machines in that room, I mean the basement of the new building, into which you say the two machines were moved?

A. There was three machines up one time.

X. 68. How long were these three up?

A. I couldn't exactly say; it might have been six months or eight months.

X. 69. About what date was it when the three were up?

A. Well, I couldn't say positive the date; it was the time we got this last new machine from Mr. Burr.

X. 70. Was there at any time four of the machines in that room?

A. No, sir.

X. 71. You have said that after moving the two out of the room where they had been operated, into the room in the new building, there were two others put up there, and at one time there was

407 three up; when was the other one, making the fourth one, put up; I don't mean, by the question, to imply that the four were up at the same time.

A. I could not state the exact date; I suppose it has been up two or three years or more.

X. 72. If this additional one was put up after the time when the three others were all up, and if there were not four up at one time,

what had become of one of those three at the time the fourth one was put up?

A. I spoke previously to this, that the third machine was sent back to Mr. Burr; that is, the second machine put up; when the third one came, the second was sent back; the machines has all been sent back to Mr. Burr as far as I know.

X. 73. Do you mean to swear, and do you swear, that there has ever been more than one machine sent back to Mr. Burr?

A. One is all I could be positive about.

X. 74. Do you mean to swear that Rankin, Duryee & Co., and Duryee, Jaques & Co., ever had more than three machines of Mr. Burr, or of Mr. Burr and his partners?

A. Well, I can swear that they have had three machines from Mr. Burr; I couldn't swear that they had more than three.

X. 75. Do you know whether any of the three machines which were up at one time, in the room in the new building, were made in the defendants' establishment?

A. Well, I couldn't say positive.

X. 76. Did you not have access to the machine department where machinery was made?

A. I don't understand that question; there is two or three machinery departments; I don't know which one you are alluding to.

X. 77. I mean the department where a hat-body machine would have been likely to have been made, if made at all?

A. I had access to the shop alluded to.

X. 78. Are you not aware that one or more of the three machines which were up at one time in the new building was made in the defendants' establishment?

A. I don't know as I am aware of all that.

X. 79. Are you not aware that there were hat-body machines made in the defendants' establishment, which were different from what is called the Boyden machine?

408 A. I am not aware that there were machines made different from the Burr machine; I don't know of any different machines being made there; I don't pretend to say there was no Boyden machines made there.

X. 80. When was the third of the three Burr machines which were up at one time, as you have stated, put up?

A. Well, I forget whether it was in 1856 or 1857; I won't be positive about that; I think it was some where in that neighborhood.

X. 81. Which of those three was first taken down; the one of them which was last put up, or one of the other two?

A. One of the other two which was put up previous.

X. 82. After that one was taken down, were the remaining two of those three operated?

A. Yes, sir, they was standing.

X. 83. Are those same two machines now operated in that factory?

A. They are.

X. 84. Then, one of the two Burr machines now in operation there is one of the first two machines which was put up in the factory, is it not?

A. No, sir.

X. 85. Why were three Burr machines up at one time?

A. We thought one was useless.

X. 86. What was the matter with the one you thought was useless?

A. Well, it was worn out.

X. 87. What part of it was worn out?

A. The cogs and the shaft.

X. 88. Had it an iron frame?

A. Yes, it had an iron frame.

X. 89. How was it as to the frame?

A. Well, as far as I know, that was good alongside of the cogs and running part.

X. 90. How was it as to the trunk?

A. If I mistake not, it was rather long-geared; the trunk was worn out.

X. 91. Where was the trunk worn out?

A. The copper was worn out, and the frame part of the trunk.

409 X. 92. What do you mean by the frame part of the trunk?

A. I mean the frame part that rises and falls to suit the cone you have on.

X. 93. Don't you know that it is customary to repair hat-body machines when they need it?

A. I do.

X. 94. Was it that machine which you say was worn in parts which was afterwards taken down, or was it one of the other two which was taken down?

A. It was the one which was worn out.

X. 95. Are you sure of that?

A. I am.

X. 96. Who took down that machine?

A. I don't know as I could say.

X. 97. Do you know that you cannot say?

A. I think I could say. I could not say.

X. 98. Do you not know any of the persons who participated in taking it down?

A. I might know them.

X. 99. Was there any other put up in its place?

A. No, sir.

X. 100. Did you consider that machine worthless at the time the last of the three was put up?

A. We did.

X. 101. Why did you not at that time take it down?

A. Well, if I mistake not, I think there was pulleys on to it that we didn't care about moving. There was a back shaft, that we hadn't up, that answered the purpose to drive this machine, and give us a little more speed, if I mistake not.

X. 102. To drive which machine?

A. The new machine.

X. 103. Where was the pulley you didn't want to move?

A. On the main shaft.

1423

X. 104. Do you mean to say that that shaft was a part of the machine?

A. No, sir; it was the main shaft in the building.

X. 105. How do you make out that your not wanting to move a pulley on that shaft was the reason that you did not want to take down that machine that you considered worthless?

410 A. It didn't make no odds about moving the pulley; this pulley drove the back-shaft; that back-shaft drove the machine.

X. 106. Was what you call the back-shaft a part of the machine, or was it a part of the shafting belonging to the building?

A. A part of the shafting which belongs to the building.

X. 107. Then I repeat the question: Why did you not take down the machine which you considered worthless at the time the third of those machines was put up?

A. Well, I don't know as I could answer that, except that it was useless. We set up this last machine about three feet, or two and a half feet from it, so as it was not in the way; and we left it simply as we hadn't time, at that time, or something of that kind.

X. 108. How long did you leave it, after the third one was put up?

A. It might have been six or eight months, not so long, perhaps; between that time.

X. 109. Do you know the name of the man who put up the third of those three machines?

A. I can't say as I do.

X. 110. Do you mean to be understood to say that you do not know the name of the man who put it up?

A. I do.

X. 111. Do you know the name of any one who assisted in putting it up?

A. I may know their names, but can't say who put it up; who helped.

X. 112. Well, if you know the name, who was it?

A. I don't know the names, as I stated. I don't know who put it up.

X. 113. Was you not about the room when that machine was being put up?

A. I think I was.

X. 114. How many persons assisted in putting it up?

A. Well, I suppose two or three, two perhaps.

X. 115. Had you ever seen any of them before?

A. I might have seen them. I don't know what you are talking about, or who.

X. 116. Do you know what you were talking about in your answer next before the last one? and if you do, state.

411 A. Well, I think there was two that put it up. My answer was previous to this, as I understood it, was on the individuals that put up the machine.

X. 117. Did you not know that my next question, after you gave the answer referred to, was also about the individuals that put up the machine, and that it inquired of you whether you had ever seen any of them before?

A. I might have seen them before, or might have not; I couldn't say as to that.

X. 118. When that machine, which you say you considered worthless, was taken down, was it taken out of doors, or was it taken to some other part of the factory?

A. It was taken up stairs into the top story, and thrown amongst the rubbish.

X. 119. What are your busy seasons in the manufacture of hats?

A. July and August, January and February.

X. 120. How many years has there been since the defendants, or the old firm of Rankin, Duryee & Co., commenced to use the Burr hat-body machines, in which hat-bodies have not been formed in the evening during one or the other of those busy seasons?

A. We commenced forming them, I could not tell the exact day of the month; we commonly run, hurried times, evenings more or less.

X. 121. Was it not a common thing for you to run both of the Burr machines in the evening during hurried or busy times?

A. Yes, sir.

X. 122. Was it not a common thing to run only one of the Burr machines in the daytime, when it was not busy or hurried times?

A. It has for a year or so back.

X 123. During your examination a Mr. Jaques has frequently been referred to; what is the first name of that Mr. Jaques?

A. Henry H. Jaques.

X. 124. Are you related by marriage or otherwise, and if so, how, to that Mr. Jaques?

112 A. By marriage; he married my half-sister.

X. 125. Have you worked for Mr. Jaques and his associates continuously during those seventeen years?

A. I have.

X. 126. You said in your examination-in-chief that a machine was put up in the Boyden room, and an experiment tried upon it; who put it up?

A. I think Bauschslicker was one; I could not call the other names.

X. 127. Who was Bauschslicker?

A. He was a machinist who worked at the factory at that time.

X. 128. Did Bauschslicker work for the defendants?

A. He worked for Duryee, Jaques & Co.

X. 129. Who superintended or directed the setting up of that machine, and the experimenting with it?

A. Well, I believe Mr. Boyden was there, and Seaver.

X. 130. Was Mr. Jaques around?

A. I think he was there one time, I would not say positive, at the time it was set up.

X. 131. How long was that machine up in that room?

A. It might have been three days, and it might have been a week; not over a week.

X. 132. You say, in your direct examination, that an experiment was tried to form a bat, and found it would not answer; who tried to form a bat?

A. Seaver was one. I don't know but what Mr. Jaques was up there.

X. 133. Who were all that were present at the trial?

A. Mr. Boyden was there; Mr. Seaver and I was there at the latter part of it, and, I think, Mr. Jaques was there after the second trial.

X. 134. Did there seem to be disappointment at the result?

A. There did.

X. 135. Which of the party appeared to be most disappointed?

A. I don't know as I could say.

X. 136. Was you in the garret from which you say this machine was taken, and which you say it was returned?

413 A. I have seen it in the garret; I saw it there before it was set up, and could not say that I have seen it all there since.

X. 137. What room or part of the factory did you have charge of?

A. The fur department.

X. 138. What room or rooms?

A. I had charge of both the forming rooms.

X. 139. In what capacity did Seaver act?

A. He worked in the Boyden forming-room, to keep the machines in order, or see that they were kept in order:

X. 140. Was there another man in a similar capacity in the other forming room; and if yea, who was it?

A. There was; his name was John H. Jaques.

X. 141. Was he related, and how, to one of the defendants, Henry H. Jaques?

A. He was a brother.

X. 142. Did he have charge in the forming room where the Burr machines run?

A. He did.

X. 143. You say, in your direct examination, that one of the Burr machines was built in an irregular manner; that the shaft through it was too light for the platform; which one of the machines was that?

A. That was a machine previous to getting the third machine.

X. 144. Was that one of the first two machines that were put up?

A. It was one of the first two, and I think it was the second.

X. 145. How long did you operate that machine?

A. I don't know as I can say the exact time; I might say three years, and I might say I could not be positive; somewhere in that neighborhood, I think

X. 146. Where did you last see that machine?

A. Well, I don't know that I could say where I saw it last.

X. 147. In how many different places did you ever see it?

A. I see it in two places.

X. 148. Is that all?

A. I believe's that all?

X. 149. Which one of those two places did you last see it in.

414 A. I see it in the first room where we had our formers, and the next time in the new shop.

X. 150. Then, the last time you saw it was in the new shop, was it?

A. Yes, sir.

X. 151. Was it up and in running order the last time you saw it?
A. I think it was taken down.
X. 152. Was it down or being taken down when you last saw it?
A. I think it was down, according to my recollection.
X. 153. Do you know of its being boxed or packed up?
Q. I think it was packed up.
X. 154. Who packed it up?
A. I could not say the man that packed it.
X. 155. You had charge of that room; would you not have known who packed it up?
A. I might have known at the time, but can't refer back. We had so many machinists then, I couldn't tell which one done it.
X. 156. How long ago was it?
A. I could not say how long it was.
X. 157. State the date, as nearly as you can, when that occurred?
A. It might have been three years.
X. 158. Was it before or after the time when the three Burr machines were up at one time in the new shop?
A. I think there were only two machines up at the time it was sent. It might have been sent back after the other one was put up.
X. 159. I did not ask you anything about sending, but I did ask you whether this machine which you say had a light shaft, and which you also say was taken down and packed, was taken down and packed before or after the three Burr machines were up at one time in the new shop?
A. This machine was taken down and packed before the three were up.
X. 160. Did you see that machine, which was taken down and packed, carried out doors?
415 A. I did.
X. 161. What was it packed in?
A. It was boxed up with boards.
X. 162. Who carried it out doors?
A. I could not say.
X. 163. Did you see the box containing it put in any place after it was carried out doors?
A. I did.
X. 164. What place did you see it put in?
A. I see it put in a wagon.
X. 165. Did you see it transferred to any place after it was put in the wagon?
A. I saw it leave the factory.
X. 166. Is that the last you saw of it?
A. That was.
X. 167. Now state the year and the month in which that took place?
A. I could not say positive what year or what month.
X. 168. Can't you, on reflection, give the year?
A. I don't know that I could.
X. 169. Haven't you any idea or recollection what year it was that this machine left the factory?
A. It might have been in the year 1855 or 1856; can't say positive.

X. 170. Are you quite positive it was in one of those years?

A. I don't know that I can speak positive on that.

X. 171. Within what period of time, or between what two dates, can you say positively that that removal took place?

A. I could not say, any more than between 1855 and 1856.

X. 172. Was it taken away from the factory in the night-time or day-time?

A. In the day-time.

X. 173. In what season of the year?

A. I think it was along in the spring or forepart of summer.

X. 174. Do you remember the day of the week on which it was taken away?

A. I do not

X. 175. Was there one or two horses to the wagon?

A. I think there were two

416 X. 176. Who drove them?

A. I couldn't say who drove them.

X. 177. Was it cold or warm weather?

A. It was warm weather, I believe.

X. 178. Was the box containing that machine marked or directed to any place or person, so far as you know.

A. No, sir.

X. 179. Whose horses and wagon was it taken away in?

A. The company's; that is, Duryee, Jaques and Co.

X. 180. Was the platform of that machine larger than the platform of the first Burr machine that was put up in that factory?

A. It was.

JOHN J. TILL.

Subscribed and sworn to before me this 18th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Counsel for defendants here offers in evidence a paper, purporting to be a receipted bill of H. A. Burr & Co., against Messrs Duryee, Jaques and Co., dated March 1st, 1858, which is hereto annexed, and marked Exhibit "16," and the counsel for the complainant admitted the bill and its execution.

UNITED STATES OF AMERICA,
Southern District of New York,
City, County, and State of New York, ss:

Be it remembered, that on this eighteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, I, R. E. Stilwell, a commissioner, duly appointed by the circuit court of the United States for the southern district of New York, in the second circuit, under and by virtue of the acts of Congress entitled "An act for the more convenient taking of affidavits and bail in civil causes depending in the courts of the United States," passed February 20th, 1812, and the act of Congress entitled "An act in addition to an act entitled 'An act for the more convenient taking of affidavits and

bail in civil causes depending in the courts of the United
417 States," passed March 1st, 1817, and the act entitled "An act to establish the judicial courts of the United States," passed September 24th, 1789, did call and cause to be and personally appear before me, at my office, United States Court Buildings, No. 41 Chambers street, in the city of New York, in the said southern district of New York, in the State aforesaid, John W. Seaver, to testify and the truth to say, on the part and behalf of the defendants, in three certain suits or matters of controversy now depending and undetermined in the circuit court of the United States for the district of New Jersey, wherein Henry A. Burr is complainant in each of said suits, and Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee are defendants in each of said suits.

And the said John W. Seaver, being about the age of 26 years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said John W. Seaver, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. John W. Seaver; twenty-six years of age; reside in Newark, New Jersey, and am a hatter.

Q. 2. Have you been in the employ of the defendants; and if so, how long, and in what capacity?

A. I have been in their employ five years next spring. I have had charge of the Boyden machines since last winter. I was about a year in the forming-room where Mr. Burr's machines were, and the rest of the time I have been to work in Mr. Boyden's room, running the Boyden machine, until last winter; and afterwards I had charge of the Boyden machines.

Q. 3. Do you remember Mr. Burr, Mr. Condit, and other gentlemen visiting and examining one of the Boyden machines while in operation; and if so, when was it?

A. Yes, sir; I recollect the time of their visiting it; I think it was about a year ago last May.

Q. 4. Did you take part in any experiment on a machine in Boyden's room in the spring of 1859?

A. Yes, sir.

Q. 5. What parts, if any, of the Burr machine were em-
418 ployed in that experiment; and what parts, if any, were wanting?

A. The iron frame, the shaft, cogs, brush, were the parts employed. The trunk was wanting, and the fan was a little different, I think.

Q. 6. Who made the fan?

A. I don't know.

Q. 7. Did you run the machine during the experiment?

A. Yes, sir.

Q. 8. Was Wickliffe Smith present at any experiment on this machine?

A. Well, he was set to hardening the hats; he happened in a few times; he came in after hats.

Q. 9. What was the result of the experiment on that machine?

A. The result was, we could not make a hat.

Q. 10. Did Wickliffe Smith ever make any remark to you about bats formed on that machine?

A. Yes, sir.

Q. 11. What did he say?

(Objected to as irrelevant.)

A. He said they never could be sized.

Q. 12. What was done with the machine?

A. It was taken down and carried in to the fifth-story room, or garret.

Q. 13. How many Burr machines were in operation down-stairs while that experiment was tried?

A. Only one, I think; yes, I know it to be so.

Q. 14. Did you ever employ a hinged piece in front of the mold-board of the Boyden machine on the machine which you ran at defendants'?

A. No, sir.

Q. 15. Was your machine next or near to William Dyke's machine?

A. Yes, sir.

Q. 16. Did you ever see a hinged piece on the front of his machine?

A. No, sir; not to my recollection.

Q. 17. Could such a piece have been used for any length of time on Dyke's machine without attracting your notice?

419 (Objected to as leading.)

A. No sir; it could not.

Q. 18. During the time you have been in the employ of the defendants, have you or not ever known more than two Burr machines to be used at one time?

A. No, sir.

Q. 19. Have you or not ever known of any work being done on Burr machines, other than for the defendants' use?

A. Not to my recollection.

Q. 20. On what machines was the work which was done for others than the defendants done?

A. On the Boyden machines.

Cross-examined by Mr. Gifford, counsel for complainant.

X. 21. Who was foreman, or had charge of the Boyden room, before you took charge of it?

A. Mr. Dykes.

X. 22. When did that room commence to be the Boyden room?

A. Not until Mr. Boyden commenced to build his machine.

X. 23. Did he experiment a good deal there, and was it a private room?

A. Well, we did not allow everybody in there. He experimented there some.

X. 24. Was Mr. Boyden understood to be an ingenious inventor?

A. I believe he is.

X. 25. Who helped him to put up the machine which you have said you run to experiment with?

A. He put it up. I don't know as I can tell who helped him; I don't recollect.

X. 26. Didn't Bauschslicker help him put it up?

A. I think he helped put it up. The one we called the Burr machine we experimented with.

X. 27. Did a man by the name of Ambs help him put it up?

A. I don't know. I don't know the gentleman.

X. 28. How many persons besides yourself, Boyden, Bauschslicker, and Smith, were present at the putting up of the machine, or at the experiment tried upon it?

420 A. No one but Mr. Till; and, I think, Mr. Henry H. Jaques was in once in a while.

X. 29. Was not Mr. Jaques's brother present?

A. I don't know but he was. I have most forgot.

X. 30. How long was that machine up?

A. I don't recollect how long it was up. I don't think it run over a half a day altogether.

X. 31. You say that it did not make good hats. What was the difficulty?

A. The fur would fly all over the room most.

X. 32. What was tried between the cone and brush?

A. We had nothing, I believe.

X. 33. Didn't you have a board or platform between the cone and brush?

A. We had nothing, only the box what the cone revolved on.

Q. 34. How many times was the experiment or experiments tried, in your presence, with that machine?

A. I couldn't be positive. I should think not more than twice.

X. 35. Do you mean that there was an effort made to form only two hat-bodies?

A. No, sir.

X. 36. What do you mean, then, in your answer next before the last?

A. I mean that we tried the experiment, but I don't know how many hats we made or tried to make at each experiment.

X. 37. By what do you divide the operation into two experiments?

A. Well, I couldn't say for certain.

X. 38. How many hat-bodies did you try to make?

A. I could not tell the exact number; I have forgot.

X. 39. State as nearly as you can.

A. I don't think there was over two dozen altogether.

X. 40. Were they all alike or were some better than others?

A. They were all about alike.

X. 41. How do you know that the Burr machines in another room were not running at the same time?

(Objected to, because the witness states that only one of the Burr machines was running.)

421 A. Because I was in there several times in the course of each day.

X. 42. In the course of each of what days?

A. Every day.

X. 43. Every of what days?

A. Each day of every week.

X. 44. During all the time that you have worked for the defendants, or all the time this machine was running?

A. All the time this machine was running, and ever since.

X. 45. How do you know that two Burr machines were not run, while you was in the other room, running this machine which you say was experimented with?

A. Well, it was against the orders.

X. 46. Against whose orders?

A. Mr. Henry H. Jaques's.

X. 47. And against what orders of Henry H. Jaques?

A. His orders were, not to run but two Burr machines.

X. 48. And that was the reason why you think one of those was stopped in the basement, while the one was running up-stairs, is it?

A. Yes, sir; I think that is one reason.

X. 49. Is that your only reason?

A. Another reason is, because we were short of work, and had nothing to do, more than one machine could do.

X. 50. Was that machine which was put up up-stairs called the Burr machine?

A. It has been called that.

X. 51. What was the date of its being put up?

A. Well, I won't be positive. I should think about 1859.

X. 52. At what time were the first Boyden machines put in operation?

A. Well, I think that was in 1859.

X. 53. Before or after the experiments you have spoken of?

A. Before.

X. 54. How long before?

A. I won't be sure, but I think about six months.

X. 55. What do you call the mold-board in the Boyden machine? (Objected to.)

422 A. I don't know.

X. 56. Do you attend the Boyden machine now?

A. Yes, sir.

X. 57. Is there a stepped piece in front of the picker in the Boyden machines?

A. Yes, sir.

X. 58. Do you have them of different sizes?

A. Yes; some are smaller than others.

X. 59. For what purpose do you have them of different sizes?

A. For to let the fur go on to the cone.

X. 60. Do you sometimes take one size off, and put another on?

A. Yes, sir; we have done it.

X. 61. When, or what causes you to make such change?

A. For the different sizes of the cone.

X. 62. Do you have them with different numbers of steps?

A. I can't say. I don't know; probably there may be more; and again, they may be some thicker than others.

Direct resumed by Mr. Harding.

Q. 63. Question 14, and the answer to it, of examination in chief, is read to witness, and he is asked what he understood by the use of the term mold-board by counsel in that question, when he answered it.

A. I thought you meant the piece on the front of the picker.

Q. 64. Do you mean the step-piece?

A. No, sir.

Q. 65. Did you ever employ a hinged piece in front of the piece next in front of the picker on the Boyden machine, which you ran at defendants'?

A. No, sir; I never did.

Q. 66. Did you ever see such a piece on any other machine at the defendants'?

A. No, sir; not to my recollection.

JOHN W. SEAVER.

Subscribed and sworn to before me this 18th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

423 EXHIBIT 16.

R. E. S., U. S. Comm.

NEW YORK, *March 1st*, 1858.

Messrs. Duryee, Jaques & Co., to H. A. Burr & Co., Dr.

PATENT HAT-BODY MANUFACTURERS,

H. A. BURR.
A. H. WRIGHT.
J. M. RIBLET.

Cor. of Cliff, Frankfort, and Jacob sts.

Terms cash.

No. of lot.	Date.	Date of delivery.		No. of Bodies.	Description of the work done.	Price.	Amount.
					Forming.		
February.							
					To 2 days Rockwell, at $3		$6 00
					2 " Smith, " 2		4 00
					1 stand for machine main-shaft		4 00
					1 new former		600 00
					Labor, storing and moving the machine		10 00
					And cartage for main-shaft stand		31

E. duplicate, H. H. J.

Received payment, March 25th, 1858.

H. A. BURR & CO.,
Per KNOX.

Indorsed: H. A. BURR & Co. Paid March 25th, 1858.

424 John Christian Raake being called, sworn, and examined on the part of the defendant, deposes and says:

Q. 1. What is your name, age, residence, and occupation?

A. John Christian Raake; fifty-two years of age; reside at Newark; and am a hatter.

Q. 2. Were you sued by St. John, Burr, and others, in the circuit court of the United States for the district of Massachusetts, for an infringement of the Wells patent; and if so, at what time?

A. I was; I believe it was in the year 1853, in January.

Q. 3. Had the machine which you used a rotating brush?

A. It had.

Q. 4. Had it an exhausted cone?

(Objected to as irrelevant.)

A. It had.

Q. 5. Had it a trunk?

(Objected to as irrelevant.)

A. It had.

Q. 6. Have you had a model made, showing the relative position and proportion of these parts in your machine?

(Same objection.)

A. I have.

Q. 7. Please produce and make an exhibit of the same.

(Same objection.)

A. I will. (Model is here produced and marked, "Exhibit, Model 15.")

Q. 8. How was the bat hardened on your machine?

A. It was hardened by hand. The fur was blown on a cover. After the fur was deposited on this cover, a dampened linen cloth was wound around the fur, and another cover was put over the whole of those, and then the cone was taken from the platform, put on the bench, and the cone taken out, and then the bat was hardened, sometimes by hand and sometimes by a machine.

Cross-examined by Mr. Gifford, counsel for complainant.

X. 9. Where, in Newark, do you reside now?

A. At 127 Walnut street.

X. 10. What are you engaged in now, as an employment?

A. In the hatting business.

425 X. 11. What part of the hatting business?

A. Pouncing.

X. 12. Who do you pounce hats for?

A. Charles Sykes.

X. 13. How long have you been engaged in pouncing hats for Sykes?

A. About two years and a half.

X. 14. Has that been your only employment during the two years and a half?

A. Mostly.

X. 15. Have you had anything else to do with the making of hats or hat-bodies during that time?

A. Sometimes I have been sizing, and that is all.

X. 16. Have you had anything to do with, or been interested in, the forming of hat-bodies by machinery, since the suit which you say was against you in the district of Massachusetts?

A. Most certainly not.

X. 17. Does Mr. Sykes make fur hats?

A. He does.

X. 18. Where are his bodies formed?

A. I do believe the greater part of them are formed at Mr. Burr's.

X. 19. Was an injunction obtained against you in the suit against you?

A. There was.

X. 20. How did this machine of yours, of which you produce the model, operate—well, or bad?

A. I think, in general, it had many advantages over Mr. Burr's. It operated well.

X. 21. Was anybody sued with you, as defendants, in that suit; and if so, who?

A. It was only me alone.

J. C. RAAKE.

Subscribed and sworn to before me this 18th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Adjourned to 10 a. m., the 19th instant.

426 SEPTEMBER 19*th*, 1861.

W. G. Hagaman, a witness called and examined on the part of the defendants:

Q. 1. What is your name, age, occupation, and residence?

A. W. G. Hagaman; fifty-two years of age; residence, Philadelphia; occupation, merchant.

Q. 2. Have you been familiar with the operation of fur-blowing and hat-forming machines?

A. Yes, sir.

Q. 3. Please examine the model now shown to you, and marked "Exhibit, Model No. 16," and state what the same represents.

A. This model represents a section of a blowing-machine for fur-blowing.

Q. 4. How long have you known such a machine to be used?

A. I have known machines similar to this, used for that purpose, for at least twenty years.

(This testimony is objected to by counsel for complainant, on the ground that there is no statement or allegation in the answer authorizing the admission of it.)

Q. 5. Were you present at the trial of issues by jury, in the suit of St. John and others against Mead and others, in the U. S. circuit court for the eastern district of Pennsylvania, about the year 1850, for infringement of the Wells patent?

A. Yes, sir; I was present.

Q. 6. Were you at that time acquainted with a machine used by the defendants, and for which that suit was brought?

A. Yes, sir.

Q. 7. Have you made a model of that machine? If so, produce the same, and make it an exhibit.

A. Yes, sir; this is the model marked "Exhibit, Model No. 17."

Q. 8. In the use of that machine how were the bats hardened?

A. By dipping in hot water. There was a flannel put around the cone after the hat was formed, and a case or screen put over the flannel, then removed from the revolving-table, and immersed in hot water.

427 Q. 9. Please examine plate 1, sheet 1, figure 1, annexed to Wells's English specification No. 7397, and state what the same represents, and how long you have known such a machine to be used, if at all.

(Objected to by counsel for complainant, on the ground that it does not appear that the witness is qualified to testify as an expert.)

(Question postponed.)

Q. 10. Have you been familiar with fur-blowing machines; and if so, how long?

A. Yes, sir; for over twenty years past.

Q. 11. Do you understand what the drawing shown to you represents, referred to in question 9?

A. I do

Q. 12. Question 9 is now propounded to the witness.

A. It represents three sections of a fur-blowing machine; I have known such a machine to be used for over twenty years.

Cross-examined by Mr. Gifford, counsel for complainant, subject to the above objections.

X. 13. Does model "Exhibit 16" represent any part of the drawing you refer to?

A. It does in principle.

X. 14. Question repeated.

A. Yes, sir.

X. 15. State definitely what figures or parts of the drawing it represents.

A. P and D and C; the picker and feed-rollers.

X. 16. You said that "Exhibit 16" represents a section of a machine similar to what you have known for twenty years or more. Wherein does it differ?

A. There is some attachments to this; there is an upright shaft that is not usually to a blowing-machine; in other respects I might say it was identical.

X. 17. Is there anything in the drawing referred to representing the curved pieces of copper, one above and one below the picker, in "Exhibit 16?"

A. No, sir; our blowing-machines are not identical.

X. 18. Is not the picker of blowing-machines embraced in a box?

428 A. Mr. Gifford, that question has a good deal of latitude; I don't know what you mean by a box.

X. 19. I mean a chamber or inclosure.

A. Yes, sir.

X. 20. In a blowing-machine is there not an endless apron in the chamber with the picker, to receive the fur from the picker?

A. None that ever I saw.

X. 21. Is not there one in the drawing to which you have referred?

A. I think not.

X. Do you swear that there is not?

A. I swear that there is not, according to my comprehension of the drawing.

X. 23. Can you swear, and do you swear, that you comprehend that drawing?

A. I think I do upon the points referred to.

X. 24. How as to other points?

A. The same; I think I understand it.

X. 25. Are you as confident about that as you are about the other parts of your testimony?

A. I am confident.

Direct resumed.

Q. 26. Explain in what way the machine represented by "Model 16" was used as part of a blowing-machine.

(Objected to, as the witness has not stated that any machine is represented by "Model 16.")

A. It was used as the first section of a blowing-machine, embracing feed-apron, feed-rollers, and picker, together with the frame and some of the pulleys; four pulleys.

Q. 27. What were the pieces represented by the upper and lower copper plates used for?

A. The top represents a board that covers the picker; the bottom represents the top of the sieve.

Q. 28. What do you understand the lines around the rollers A B to represent in the drawing?

A. I understand those to be the feed-aprons.

Q. 29. How did they work? What was done by them?

429 A. To convey the fur from one picker to the next feed-rollers.

Q. 30. Explain the entire operation of that machine shown in the drawing, as you understand it.

A. I understand the fur to be put upon the first apron, taken by the feed-rollers attached, carried to the picker, the picker throws it up, by the assistance of a draught of air back of the picker, upon the next feed-apron, and so carried through the entire machine.

Q. 31. What did you understand by the term "endless apron," when you gave your twentieth answer?

A. I understood it to mean but one apron, from one end of the machine to the other; whereas, blowing-machines that I have seen and worked with have a number of aprons.

Q. 32. To what extent have you worked with blowing-machines, if at all?

A. I have built blowing-machines, and worked with them for at least, I think, twenty years or upwards.

Q. 33. Have you ever made, or been employed to make, models for the complainant, H. A. Burr?

A. I have made the model for Mr. Burr—a model of a machine that was running in Philadelphia at one time.

Q. 34. Have you ever run Burr and Taylor's hat-body machines, or constructed them?

A. Yes, sir, both; those are the ones I have reference to.

Q. 35. Did you construct these machines while you were a licensee of Mr. Burr?

A. I constructed and built one; I should say in part, because we used part of the old material, after the fire.

Cross-examination resumed.

X. 36. You have spoken, in your examination in chief, of having been a licensee; do you mean a licensee under the Wells patent, as well as under the Burr and Taylor patent?

A. I always considered them as combined, when I was a licensee.

X. 37. Over what territory did your license extend?

A. Over Philadelphia, and fifty miles around Philadelphia, in the State of Pennsylvania.

430 X. 38. Did you sell your license; and if yea, for what price?

A. We sold our license, together with the machinery; I can't tell what we got for the license, as they all went together.

X. 39. What did you get for the whole?

A. Twenty-two thousand dollars.

X. 40. How many hat-forming machines were included in that sale?

A. Five.

X. 41. What other machinery was included in the sale?

A. A number of blowing-machines, and a picker.

X. 42. Did you make the models Exhibits 16 and 17?

A. I did.

X. 43. Have you at any time sold any interest in a patent to the defendants, or any of them, appertaining to hat-body machines?

A. No, sir; not that I know of. I do not know the defendants, who they are.

X. 44. Well, to Duryee, Jaques and Co., or any of them?

A. No, sir; I have not.

X. 45. Have you recently sold an interest in a patent appertaining to hat-body machines, to anybody?

A. Yes, sir.

X. 46. To whom?

A. A gentleman of Philadelphia, by the name of Henry M. Kinney.

X. 47. Did you sell him the whole patent?

A. No, sir.

X. 48. What interest was it?

A. It was a certain district specified in the agreement, which I cannot specify from memory.

X. 49. Did it not include New Jersey?

A. No, sir.

X. 50. State as nearly as you can what district you sold.

A. I can't state from memory now the district. It was in New Jersey, but it was not New Jersey; the district was a part of New Jersey.

X. 51. Does it not include Newark?

A. I think it did; that is my recollection of it.

X. 52. Are you not aware that Duryee, Jaques and Co., or some of them, have obtained it?

431 A. No, sir; I am not aware that any of that firm, or any other firm in Newark, have it.

X. 53. What did you receive for it?

A. One thousand dollars.

X. 54. Have you been paid for making Models Exhibits 16 and 17?

A. No, sir. As to Model 16, I made it for myself some time ago, for another purpose

X. 55. Do you expect to get paid for "Model 17?"

A. I don't know; I may, and I may not; I have not much expectation about it.

X. 56. You say that the lower piece of copper in "Model Exhibit 16" represents what was a sieve, or part of a sieve, in a blowing-machine. What was a sieve there for?

A. I said the top part of the sieve. This sieve was to separate the hair from the fur that falls in the aperture between the picker and feed-apron roller. The reason I say that, the copper under the picker represents the top of the sieve, or the sieve in the blowing-machines that I used. I always covered the top of the sieve next to the picker with some smooth surface, so as not to hold the hair or fur from going down on to the sieve.

X. 57. So as not to hold it by what?

A. By any roughness that may occur in making the sieve.

X. 58. How could a roughness occurring in the making the sieve hold the fur from going down on to the sieve?

A. By putting the wires into the wood, making the holes, etc.

X. 59. After the machine was constructed, where would such wires project from as would hold the fur from going down on to the seive?

A. From the frame of the seive.

X. 60. Then, if I understand you, you put a smooth surface over the end-piece of the sieve, so as to prevent any roughness of the end-piece interfering with the fur going down upon the sieve. Am I correct?

A. Yes, sir; that part of the fur I mean now that falls in the shape of what we call "dags" under the machine.

X. 61. What material did such surface consist of?

A. I generally used varnished leather.

432 X. 62. Was it attached to any part of the machine?

A. Only to the seive, the frame each side, and the board back of the sieve.

X. 63. How wide were the end-pieces of the sieve?

A. From three to four inches, generally.

X. 64. How far did the end-piece of the sieve extend back of the picker?

A. As a general thing, about an inch and a half or two inches, according to circumstances.

X. 65. How large in diameter was the picker?

A. Pickers in blowing-machines vary in size; from four to six inches, the machines that I used.

X. 66. It was your object, then, was it not, to bring that part of the fur which you call "dags" upon the sieve as soon as possible after it left the picker?

A. Yes, sir.

X. 67. Then to have had the leather piece any wider than what was necessary to cover up the end-piece of the sieve would have been objectionable, would it not?

A. No, sir; it could not be objectionable, for it ought to cover the wires a little below the frame.

X. 68. Why?

A. To prevent the hair from working in between the leather and the frame.

X. 69. Suppose the end-piece of the sieve had been made entirely smooth, and the ends of the wire so disposed of as to not stick up, what would have been the use of the piece of leather, if of any use?

A. If it could be made perfectly smooth, there would have been no use, according to my judgment; but I took that plan as the easiest and cheapest to remedy the difficulty.

X. 70. Why did you not glue a piece of glazed cloth or leather upon the end-piece of your sieve, so as just to cover the end-piece, and make the surface entirely smooth?

A. Because I never thought of cloth; if I had, I should have considered leather the best.

X. 71. Don't you know that glazed cloth is used in blowing-machines, under the pickers, to cover the joint where the frame of the sieve is hinged to the machine?

433 A No, sir; I don't know that.

X. 72. Do you know of a blowing-machine now in use, having a piece of leather to cover up the end of the sieve-frame under the picker?

A. No, sir.

X. 73. How far did you find it necessary, if necessary at all, to have the edge of the leather extend over the wire, beyond the frame-piece?

A. I usually had it about an inch.

X. 74. Now, Mr. Hagaman, look at the model, "Exhibit 16," and say whether, according to what you have testified to, that lower copper piece in its extension out, is in the correct proportion to represent the position of your piece of leather?

A. I don't know in what respect. I don't think it is in exact proportion.

X. 75. How many pickers were there in each of the blowing machines which you used?

A. I can't tell from memory; from four to eleven.

X. 76. Were they in separate chambers, or all in one chamber?

A. In separate chambers.

X. 77. What was between those chambers to separate them from one another?

A. Board partitions.

X. 78. Was there a pair of feed-rollers to each picker; and if yea, where were they located?

A. There was a pair of feed-rollers to each picker; they were located in the partitions, sometimes varying a little.

X. 79. Is it an object, in blowing fur, to throw it by the picker up into the chamber?

A. Yes, sir.

X. 80. Why?

A. To throw it on to the next feed-apron.

X. 81. Is it not an object to so throw it to facilitate the separation of the hair from the fur?

A. Some think it is; but I doubt it.

X. 82. In which direction did your pickers run?

A. The side next the feed-rollers run down.

X. 83. If there was such a cap or piece over your pickers, as
434 is represented by the top-piece of copper in "Exhibit, Model 16," what was its effect in the operation of the machine?

A. It facilitated the fur in going on to the apron, by giving it direction that way.

X. 84. Would not such a piece tend to keep the the fur down?

A. I think not; but I never used one just in that shape.

W. G. HAGAMAN.

Sworn and subscribed to before me this 19th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Francis E. Treadwell, jr., a witness examined on the part of the defendants:

Q. 1. What is your name, age, residence, and occupation?

A. Francis E. Treadwell, jr.; age, about thirty-eight; residence, York; solicitor of patents, occupation.

Q. 2. Have you paid attention to the subject of hat-body making by hand, and by machinery, and the preliminary process of preparing the fur? and if so, state generally your means of knowledge in this branch of art.

A. I have paid considerable attention to machines for forming fur hat-bodies, and also am acquainted with machines for preparing fur for hat-bodies. I have been engaged in experimenting with machinery for the purpose of making hat-bodies of fur at different times. My attention was first called to the matter by some operations of

Lansing E. Hopkins, and conversations that I had with him about the time of his getting up the machine, the subject of one of the present suits; I afterwards was called into the case of Burr *vs.* Cowperthwaite, to testify, as an expert, on the part of the defendant, and at that time investigated the subject of making hat-bodies by machinery pretty thoroughly. I have, since then, made further investigations and experiments with practical working machines, and have examined a large number of patents and publications bearing upon the state of the art. I believe myself to be well acquainted with most of the hat-forming machines in use.

435 Q. 3. Have you examined, and do you understand the letters patent to Thomas Robinson Williams, A. D. 1833, No. 6387; William Ponsford, A. D. 1839, No. 7935; William Angus Robinson, A. D. 1838, No. 7608; Henry A. Wells, A. D. 1837, No. 7397; Thomas Robinson Williams, A. D. 1840, No. 8646; Stephen Hurlburt, June 13th, 1831; William Fosket's patent, reissued March 23d, 1858; and the prior patents of 1846, January 23; Hezekiah Miller's patent, March 5th, 1839; Thomas Blanchard's patent, June 14th, 1837; Thomas R. Williams's patent, (United States,) April 24th, 1840; original letters patent of H. A. Wells, of April 25th, 1846; the two reissues thereon to Charles St. John and others, Nos. 396 and 400, (1856,) and the two subsequent re-reissues, Nos. 1086 and 1087, December 4th, 1860; the letters patent of A. B. Taylor, reissue No. 1030; letters patent of Lansing E. Hopkins, No. 9484, December 21st, 1852; letters patent of Burr & Taylor, February 9th, 1847, No. 4962?

A. Yes.

Q. 4. Have you examined the model in the Patent Office, of T. R. Williams's patent of April 24th, 1840; and if so, have you examined a certified model of defendants' "Exhibit Model 18." And state whether it corresponds or differs with said model in the Patent Office.

A. I have examined it, and it is a correct copy of the model in the Patent Office. The model in the Patent Office is in three pieces, namely, one model of an organized machine, and two pieces representing parts of devices to be used as alternatives for some of the parts in the machine. I mean the exhaust-box and exhaust-fan, and revolving cone-stand.

Q. 5. Please mark the three pieces of "Exhibit 18," 18 A, 18 B, 18 C, respectively.

A. I have done it.

Q. 6. State if the piece "18 B" and the piece "18 C," and any other portion of the machine fit together or correspond; and explain how and wherein.

A. The piece "18 B" and the piece "18 C" fit together and correspond; they are intended, no doubt, to take the place—

(Counsel of complainant objects to the witness guessing at intentions.)

436 They appear to be fitted to take the place of the exhaust-box that is now under the perforated cylinder in the machine—

(Counsel for complainant objects to the further use of the model, "Exhibit 18," because the witness, in trying to adapt the parts which he referred to, has broken it.)

when the side-casing of the cylinder, and the perforated cylinder and the exhaust-box, now on the model, is removed.

Q. 7. In fitting them together I observed that you removed certain pieces; please mark those pieces, and restore them to their places. And state whether the model is or is not identical with its former condition and the model in the Patent Office, and whether or not said model is broken now, or any part thereof.

A. I have marked the top-casings, cylinder, and side-casings, and two journals or boxes in which the cylinder runs; I have restored them to their former place. The pieces I have marked I removed in order to see whether the pieces "18 B" and "18 C" fitted as in the original at the Patent Office. The model is now identical with the model at the Patent Office, at the time when I examined it.

Q. 8. Were you present at the argument of the suit of St. John, Burr, and others, against James H. Prentice and others, in the circuit court of the United States for the southern district of New York; and if so, did you see the defendants' machine, or the model thereof, in said case?

A. I was, and I saw the model of the defendants' machine at that time.

Q. 9. Please examine complainant's "Exhibit D," and state whether said model, so far as relates to pervious cone, trunk, and picking and feeding mechanism, corresponds with, or differs from, said defendants' machine in said suit.

A. The model I saw in court at that time had a picker and feeding mechanism, and bifurcated trunk, and pervious cone, like the model, "Exhibit D."

Q. 10. Have you seen the Burr and Taylor machine, or a machine constructed according to the Wells patent, or the Boyden machine, in practical operation?

A. I have seen each of these machines in practical operation.

437 Q. 11. Did you see the Wells machine, so called, at the complainant's factory?

A. Yes; I saw a machine that was shown to me as the Wells machine, by Mr. Burr, on Monday morning last, at about ten o'clock.

Q. 12. Did you see it in operation?

A. No.

Q. 13. Did you request to see it in operation?

A. Yes.

Q. 14. Was your request acceded to?

A. No.

Q. 15. Please examine "Exhibit 19," now shown to you, and state by whom that was constructed, if you know, and what it represents.

A. It was constructed under my direction, and it represents a full-sized trunk, proportioned according to the drawings of the original Wells patent, and reissues Nos. 1086 and 1087.

Q. 16. What do the appendages represent in said exhibit?

A. The hinged hood and hinged flap with its lever, attached to

Exhibit 19, represent full-size working parts, according to the drawings of said patent and reissues.

Q. 17. What does "Exhibit 20 A" and "20 B" represent?

A. "Exhibit 20 A" is a cone I have used with the trunk in making experiments with it, and "20 B" a table which I have had constructed to set the cone on, at the same relative height to the trunk, as in the experiments I have made.

Q. 18. What preparation does the fur undergo in the process of making hat-bodies by hand, and in the process of making by the several machines to which you have alluded?

A. The fur is previously blown in a blowing-machine, by which it is disintegrated, and cleaned, and separated from hair. Sometimes, in hand-bowing, the fur is disintegrated before bowing, by the bower with his bow-string, by snapping it among the fur.

Q. 19. What are the different parts of the machines which perform the leading operations, in the process of forming bats or bodies on the several machines patented, as referred to in question "three"?

438 (Counsel for complainant objects to this question, on the ground that it calls for a large quantity of matter in answer, which is irrelevant to any issue in these suits. and is inadmissible, and will render the record needlessly voluminous; and upon the ground, further, that the question does not ask the witness to point out the adaptation or capability of the machines severally, but leaves him to jumble the parts of some with the parts of others, and, therefore, to present in his answer combinations which nowhere exist in any of said machines, and which can only lead to confusion and obscurity.)

(Question withdrawn.)

Q. 20. Referring to the Wells machine, specify the leading functions performed in the operation of forming hat-bodies?

A. In the Wells machine there is a fur-throwing mechanism, which throws the fur into a trunk or conductor, through which the fur passes on its way to a pervious exhausted cone, exhausted by an exhaust-fan and exhaust-box beneath the cone. The office performed by the trunk or conductor is to receive the fur thrown by the fur-throwing mechanism in its larger end, and conduct it to a place opposite to the pervious cone, where it is discharged through the smaller end of the trunk, a narrow opening or aperture opposite a narrow vertical section of the pervious cone; a current of air enters the back part of the casing of the fur-throwing apparatus below the fan-brush, which is induced partly by the exhaust from the pervious cone, and partly by the action of the fan-brush. As the mixed current of fur and air passes through the trunk the fur becomes constrained or condensed by the narrowing of the trunk, and assumes a different formed section when discharged from the trunk or tunnel from its form in the larger end of the trunk. There are attached to the front of the discharge aperture of the trunk a hinged hood and a hinged flap, the upper one of which, the hinged hood, has a two-fold office, it may be used either to change the direction of the current of fur as it leaves the trunk, during the formation of a hat-body, or it may be used to partly close the discharge aperture during the whole time of

forming a hat-body. The lower hinged flap, or deflector, is used for the purpose of enlarging the discharge aperture.

439 Q. 21. What does the fur-throwing mechanism consist of?

A. It consists of a feed-apron, feed-rollers, or nipping-aprons, a rotating cylinder, having rows of bristles upon it, a casing, with an aperture below and back of the brush-cylinder, and curved plate behind the brush, upon which the fur is brushed or laid by the brush cylinder, after it is taken from the nipping-rollers.

Q. 22. Have you substituted for the brush any other fur-throwing mechanism, in a Wells machine, in order to ascertain how the fur was thrown; if so, specify what devices you substituted for the brush?

A. I have used a fancy card cylinder and a fan in a Burr and Taylor machine, in which the fur was presented by a card cylinder to blow the fur through the trunk, in place of the rotating brush generally used in that machine. I mean I have experimented with them.

Q. 23. How did you find the card cylinder and the fan to throw the fur?

A. Very well; as well as the brush.

Q. 24. Did you try a revolving brush in connection with a carding cylinder?

A. Yes.

Q. 25. How did that throw the fur?

A. Very well; as well as the fancy or the fan. I could discover no difference in the operation of them, so far as throwing the fur was concerned.

Q. 26. Have you seen or tried a brush on a Wells machine without a card cylinder, and if so, how does its operation compare with that of the carding cylinder and fan, or the carding cylinder and brush, as a fur-throwing apparatus in hat-body making?

A. Yes, I have tried a brush supplied with fur from nipping rollers; it throws the fur very well; so far as throwing the fur is concerned, I don't know of any difference between taking it from the card cylinder or from the nipping rollers?

Q. 27. In which, if any, of the patented machines described in the patents mentioned in the third question do you find a feeding apparatus and a fur-throwing mechanism, substantially the same as that used in the Wells machine?

440. A. In the English patent of Thomas Robinson Williams, A. D. 1833, No. 6387, as shown in figure 3, sheet 2. William Ponsford, A. D. 1839, No. 7935. Thomas Robinson Williams, English patent, A. D. 1840, No. 8646, as shown in sheet 4, figures 12 and 13. William Angus Robertson, A. D. 1838, No 7608, figure 2, sheet 1. In the American Williams patent, April 24th, 1840, and in the letters patent to William Fosket, January 23d, 1846, and reissue of same, No. 538. These are all that I recollect of a prior date to the Wells patent, that have substantially the same feeding mechanism and fur-throwing mechanism in combination. In the patent of Hezekiah Miller the fur is thrown by a fan, and in the patent of Thomas Blanchard it is thrown by a quick-fancy. In the English patent of Williams, of 1833, before referred to in this answer, fur is represented as being thrown by a fan. In these three latter cases

the fur is presented by a card cylinder or doffer, but it is thrown substantially in the same manner as in the Wells machine.

Q. 28. In which, if any, of said machines do you find any provision made for the admission of air below a revolving fur-throwing mechanism?

A. In all the machines mentioned in my last answer, excepting William Fosket's.

Q. 29. In which of the machines in question three do you find a revolving perforated former, or perforated vacuum surface, for the deposit of the fur?

A. In all, except Hezekiah Miller's.

Adjourned to Friday, the 20th instant, at 10 o'clock a. m.

FRIDAY, *September 20th*, 1861.

Counsel on both sides present.

Q. 30. How is the hat-body formed, by the Wells machine, of the required proportion of thickness of brim and tip?

(Objected to, on the ground that it does not appear that the witness has any knowledge of the subject, other than from the patent, and so far as the patent is concerned it must show for itself.)

A. By moving the hinged hood up and down, to direct the
441 deposit of the fur fibres in properly regulated quantities; and also by moving the hinged flap.

Q. 31. So far as the result mentioned in the last question is concerned, state, if you know, what is the effect of removing the hood altogether, and state how you know?

A. I do know; I have tried it by forming a bat with the hood thrown back on the top of the trunk; the tip of the bat produced was too thick; a bat of the properly regulated thickness cannot be produced without a hood in combination with the discharge aperture of the trunk.

Q. 32. So far as that result is concerned, above inquired, what is the effect of fixing the hood permanently in one place during the operation of forming a hat-body?

A. It would make a bad bat. If the hood is held down in a fixed position, so as to interpose between the tip of the cone and the upper part of the discharge aperture, it would prevent the fur from going on to the tip; and if held in a fixed position above the tip it will not direct a sufficient portion of the fur towards the base of the cone, and therefore the tip will be the heaviest.

Q. 33. Have you examined "Exhibits A and B," and do you understand them and their modes of operation?

A. Yes; I have examined them, and do understand their modes of operation.

Q. 34. In your opinion, are the said machines substantially the same or substantially different in construction or mode of operation from the invention of Henry A. Wells, set forth in the patent reissue 1087?

A. They are substantially different, both in construction and mode of operation.

Q. 35. Give your reasons for this opinion.

A. I do not find in the "Exhibits A and B" the trunk, hinged

hood, and hinged flap, described in the Wells reissued patent, or any equivalent therefor, or any device by which the mode of operation of the trunk, hinged hood, and hinged flap can be performed. In the Wells machine one extremity of the trunk operates as a chamber, in which the fur is received and is adapted in form for that purpose. There is no such device or mode of operation in the Exhibits "A and B." In the Wells machine the other extremity acts as a dis-
442 charge aperture to the trunk to discharge the fur opposite to and against a narrow vertical section of the pervious cone. There is no such device or mode of operation substantially in the Exhibits A and B. In the Wells machine the trunk acts as a conduit or pipe to convey or conduct the mixed current of air and fur fibres towards the cone, and its shape between the receiving and discharge apertures is adapted for that purpose; and the trunk, taking the form of a tunnel, is smaller at its discharge aperture, and concentrates the mixed current of air and fur fibres thrown into the larger end as it approaches the discharge aperture. There is no such operation substantially performed by any device in the Exhibits "A and B." In the Wells machine the hinged hood, in combination with the discharge aperture, is moved up and down for the purpose of properly regulating the deposit of the fur fibres upon the cone. There is no such contrivance or mode of operation substantially in Exhibits "A and B." In the Wells machine the hinged flap, in combination with the trunk, is moved up and down to vary the deposit of fur fibres on the base of the cone. There is no such device or mode of operation substantially in the "Exhibits A and B." In "Exhibits A and B" the fur is thrown, by the conjoint operation of the rotating picker and curved or stepped plate, into the open air in such a manner that it is drawn by the action of the exhaust upon a pervious cone, in properly regulated quantities to form a hat-body. The character of the deposit depends upon the relative position of the picker and pervious cone, force of the exhaust, and the form of the stripper. In Exhibit A the action of the picker, exhaust, and stripper upon the fur fibres is modified by a current of air, which is blown through a pipe connected with the exhausting mechanism, and which discharges at a point below the casing of the picker, so as to impinge upon the fur-bearing current proceeding from the picker to the cone. There is also a valve or a shutter, by which the current of air proceeding from the pipe is directed nearly at right angles to the direction of the current proceeding from the picker to the cone. There is no such device or mode of operation in the Wells machine, nor substantially any such device or mode of operation. There is nothing in Ex-
443 hibits A and B by which the current of fur can be thrown against a narrow, vertical section of the cone; and nothing by which the free passage of the fur fibres from the fur-throwing mechanism to the cone (except as controlled by currents of air) is interfered with. In the Wells machine air is admitted to the fur-throwing mechanism through a hole in the casing thereof, which is induced partly by the action of the exhaust through the trunk and partly by the rotation of the fan brush. There is no contrivance in the Exhibits A and B by which air induced from the exhaust can be thus

directed or controlled from behind the picker, so as to sweep over the teeth of the picker between a guide and the picker, but, on the contrary, the pickers are supplied with air from the open room, uncontrolled by any passage-way or trunk. I find that Exhibits A and B do not contain substantially such means of inducing and controlling a current of air to act upon the fur-throwing mechanism as in the Wells machine. In Exhibit B the current of air is produced by an independent fan-blower, which blows into the air under the machine, and there is a vein to direct some of the air upwards so as to impinge upon the fur-bearing current at right angles, or nearly so, as in Exhibit A. I do not find such a combination of devices, or substantially such a combination of devices, in the Wells machine.

Q. 36. Please examine the second and third clauses of claim in reissue 1087, and state whether you have made a sketch representing the association of parts set forth in said claim as described in said specification?

A. Yes, I have made such sketches.

Q. 37. Please produce, explain, and mark them as exhibits?

A. I now produce them, and they are marked exhibits 21 and 22. Sketch exhibit 21 represents the rotating brush and casing n, marked A, a hinged hood marked B, and a pervious exhausted cone marked C; the outlines of the cone and hood only are shown. Exhibit 22 represents the rotating brush and casing marked D. The hinged flap marked Q, and the pervious exhausted cone marked E, shown only in outline. The exhausting mechanism is not shown.

Q. 38. Have you made any experiment to ascertain whether
444 such an association of parts as is mentioned in each clause of the claim, respectively, would constitute an organized combination producing a practical result, and, if so, state the experiment and result?

A. Yes, I have made such experiments. I took off the trunk and held a pasteboard hood of the form and size of the hood on the trunk, in the place occupied by the hood in the Wells machine, and other places between the rotating brush and exhausted pervious cone. I, also, while the trunk was off, held the hinged flap, of the size and form described and shown in the Wells patent, between the brush and the base of the cone in the position shown in said patent. I could not find that they produced any useful effect, the fur from the brush going all over the hood and cone and myself, and room; the hinged flap acting only to obstruct the passage of what fur was passing towards the base to the cone, and no practical result can be produced by either of the said combinations irrespective of their connection and combined action with the trunk.

Q. 39. Do you find, in the descriptive part of the said specification, anything to direct a person as to the construction or association of the parts mentioned in those claims respectively, other than as is represented in the drawings exhibits 21 and 22?

A. No, I do not find any direction in the specification to construct or adapt the parts in any other way than as shown in the drawings exhibits 21 and 22, as explained in my answer No. 37.

Q. 40. Have you made any experiment to ascertain what would be

the effect of the exhaust cone as to a current of air below the picker, if the trunk were to be removed in the Wells machine; if so, state with what result?

A. Yes. I removed the trunk and board from under the picker, and set the exhaust in action, the rotating brush remaining still; I placed a candle close under the picker, and placed a pervious cone over the exhaust, such as is commonly used in forming hat-bodies. The flame of the candle showed no perceptible action of the exhaust upon it in that position. I do not think there is any practical current of air under the picker produced by the exhaust, unless operating through the trunk.

445 Q. 41. Do you or not find in the Exhibits A and B, or in the use of machines like said exhibits, in the formation of hat-bodies, any process of hardening the bats substantially the same as the process of Wells in reissue 1086, and give your reason?

A. I do not find any device in said machines by which the operation of hardening a bat described in the said reissue can be performed, or by which substantially such an operation can be performed. In the Wells reissue the bat is hardened by dipping it in hot water while held on the pervious cone by a cloth and cover. In Exhibits A and B the bat is hardened dry, without removing it from the cone stand, by the action of a flexible cloth operated by machinery.

Q. 42. Does or does not machine Exhibit A or B contain any combination of devices substantially the same in construction and mode of operation as substantially set forth in Lansing E. Hopkins patent, No. 9484, and give your reasons?

A. I do not find that either Exhibit A or B contain any combination of mechanism for blowing the exhaust air from the former into a chamber for the purpose and in the manner described in the Hopkins patent, or for substantially the same purpose or in substantially the same manner. In the Hopkins patent the air passing through the cone is described as being driven through the chamber by the exhaust fan past the picker, driving the fur towards the cone, and is also stated that this operation may be aided if necessary by wings on the ends of the picker, which also blow air into the air chamber. There are no such wings or equivalents for them in either Exhibit A or Exhibit B, and no connection between the picker and an air chamber in either Exhibit A or Exhibit B, or any mode of supplying air to an air chamber from the picker, the air in the Exhibits A and B which passes over the picker or operates upon the teeth of the picker is supplied from the open room. In the Hopkins machine the air passing through the cone is described as being driven into an air chamber behind the picker; in Exhibit A the air is driven through a hole marked on the bottom of the exhaust box, and a small portion of it only, regulated by an adjustable valve, taken from the exhaust box under the cone

446 and driven through a pipe which opens under and in front of the picker casing. In the Hopkins machine, as described and shown in the letters patent, the air blown through this chamber passes into a trunk which gives it a direction towards the cone. In Exhibit A there is no trunk or any means beyond the aperture of the discharge-pipe to give the fur a renewed direction towards the cone, but, on the

contrary, the valve or shutter when raised up interferes with its progress towards the cone. In the Hopkins machine, as described and shown in the patent, the valve or shutter to the air chamber when partly opened would throw a current downwards from behind the picker, and would not blow past the picker towards the cone, were it not for the trunk which guides it underneath and past the picker-teeth and directs the fur blown from the picker-teeth towards the cone; take away the trunk from the front of the air chamber of the Hopkins machine, as described and shown in the patent, and the conjoint action of the picker and current from the air chamber would not throw the current of fur towards the cone, but it would sling it around backwards over the feeding table. There appears to be no other mode in the Hopkins machine of supplying the picker with sufficient air to carry the fur to the cone than through and from the air chamber described, and some way of supplying the picker with air is necessary to carry the fur through the trunk in a proper manner to form a hat-body. In the Hopkins machine the usual hole in the casing back of the picker in trunk machines is stopped up by this wind chamber, into which the air passing through the cone is driven by the exhaust fan, and the air so introduced performs precisely the same function as the air introduced through the hole in the casing back of the brush in the Wells machine, or air introduced by openings behind and under the rotating picking mechanism of other trunk machines. The effect of driving the air passing through the wind chamber and trunk of the Hopkins machine would be to prevent the formation of a hat-body. The force exerted by the atmosphere passing through all parts of the pervious cone concentrated upon a narrow section thereof, by the operation of driving the air through the trunk and impinging it upon such narrow sections, would tear off or blow off the fur fibres;
447 no hat-body could be made by the operation of such a combination of mechanism. In Exhibit B there is no wind chamber and no air that passes through the cone driven by any kind of mechanism past the picker towards the cone. I do not find in Exhibit A or Exhibit B any hardening rollers combined with a perforated cone by means of a yielding or hinged frame, substantially in the manner and for the purpose described in the Hopkins patent, neither do I find any device substantially the same in construction or mode of operation as the rollers described in said patent, combined with a pervious cone by means of a yielding or hinged frame. The frame in Exhibits A and B, when brought up to the pervious cone to act in combination therewith, is latched to the side of the machine, and has no capacity to yield to accommodate the inequalities or irregularities of the surface of the cone. These are accommodated by the flexible nature of the hardening cloth; the hardening cloth does not roll upon the surface of the bat, neither is it pressed upon the bat by the action of the hinged frame. It has no yielding pressure applied to it, but is sucked or drawn to the surface of the bat by the action of the exhaust alone. In the Hopkins machine, as described and shown in the patent, an inequality upon any part of the surface of the bat, or irregularity of the surface of the former which would cause the frame to yield and move on the hinge, would lift all the rollers from the sur-

face of the bat, one of the rollers only touching the inequality that caused it to raise, and this would occur every time the same place was reached in the revolution of the cone, the flexible nature of the hardening cloth in Exhibits A and B, as I have before said, accommodates these inequalities without the necessity of the frame to yield; the action of the hardening cloth upon the surface of the bat is not a rolling action, but the action of a surface held stationary with reference to the rotation of the cone, and so flexible as to operate on the fibres of the bat by the agitation of the surface itself, instead of by the rolling and rubbing action of the inflexible surface of the jigger-rollers.

Q. 43. Do you or do you not find in exhibits A and B the invention described in the reissue patent of A. B. Taylor, No. 1030, granted to H. A. Burr, and specified in the first claim thereof, and give your reasons?

A. I do not find in Exhibits A or B a vibrating concave sur-
448 face, substantially as described in the reissue of the Taylor patent, in combination with an exhausted pervious cone, on which the bat is held by a pressure of the surrounding air, substantially as described in said reissue; neither do I find any device by which the mode of operation of the cover described in said reissue can be performed. The vibrating concave surface described and shown in the patent consists of an inflexible metallic cover sufficiently rigid to maintain its form under the action of a weighted roller. It has a reciprocating motion like the Hopkins' jigger-rollers, and is held against the bat by a yielding mechanical pressure applied to the pressure-rollers, in which it also resembles the Hopkins' patent. It rolls on the surface of the bat, in which it also resembles the Hopkins' patent, but uses the inside of the conical cover, or eccentric roller, to make pressure upon and rub the surface of the bat. The cover shown in the drawings is perforated to permit the air to pass through it on the way to the centre of the cone, which prevents the fur from being sucked up into the tip of the cover, as would be the case if the non-perforated cover, described as an alternative device for the perforated cover, were used. I find no such construction or mode of operating upon the bat embodied in the Exhibits A and B. The hardening device in Exhibits A and B consists of a cloth, the acting surface of which is enameled, so as to be practically impervious to air. It is a straight or flat cloth, not made into any form by gores or seams. It is attached to, and hangs loosely and bagily from two long slender rods, which have a very rapid reciprocating motion. On each side of the middle of the back part of the cloth are two long slender whips or beaters, which alternately beat rapidly against the surface of the cloth. The motion, both reciprocating and beating, is exceedingly rapid, and produces a shivering or very rapid undulating action upon the surface itself of the cloth. The beaters, acting against the back surface of the cloth, create a corresponding reaction of the atmosphere in front of the cloth, which to a certain extent stiffens or holds the cloth suspended in a shivering condition. When the cloth is brought up near to the
449 surface of the cone, the middle part of it is drawn against a narrow section of the surface of the cone by the action of the exhaust. The shivering or undulating action of the cloth

operates to cause the fur fibres of the bat to creep together or felt, and there being no pressure upon the surface of the bat by the hardening cloth except the pressure which holds the bat to the surface of the cone, the fibres of the bat are not affected or rolled up in welts by the rotation of the bat against the non-rotating surface of the cloth. The undulations of the surface of the cloth at the sides of that part of the middle which is in contact with the bat break up the currents of air, which would otherwise draw over the surface of the bat into the bight, and roll up the fur sufficiently to make welts on the bat.

In the Taylor machine there is no provision for reciprocating a weighted section of a cover upon the surface of the bat. To do so would involve dispensing with the rollers as rollers, and making slides or ways for the section to reciprocate upon. The rolling action that the cover now has would be destroyed, and a new action would be introduced which would be inconsistent with anything in the said Taylor reissue—namely, rubbing the bat against a surface which is stationary, with reference to the circumferential motion of the bat. In the Boyden hardening device two new features are introduced which distinguish it from the hardening mechanism of the Taylor machine, which differs from the jigging-rollers formerly used only in being perforated and in using the inside instead of the outside surface of a conical roller to act upon the bat. The new features which distinguish the hardening mechanism in exhibits A and B, and give it the character of a substantively new device, in view of the Taylor patent, are as follows: first, the vibration or shivering of the surface itself of the hardening device; and second, the action of the hardening device in opposition to the rotation of the bat.

The flexible nature of the surface of the hardening cloth gives it capacity to act uniformly upon the surface of such part of the bat as comes in contact with it, being sucked or drawn in contact with all parts of the surface.

The action of the undulating surface is exceedingly delicate; the lateral thrust from the undulations, although infinite in number and as infinitely rapid, are very delicate, and do not disturb the organization of the bat, but promote the creeping together or felting of the fibres of the bat. When the hardening operation is finished on the machines exhibits A and B, the bat may be removed readily from the cone without even taking off the exhaust, and without reversing the current to blow it off as described in the Taylor reissue. I have repeatedly passed my hand between the hardening cloth of such machines and different parts of the rotating bat while the operation of hardening was going on, and this did not prevent the action of the other parts of the cloth which were not raised by my hand from the surface of the bat.

Q. 44. State whether you have tried the operation of hardening bats according to the operation set forth on page 3, fol. 20, of William Ponsford's (English) patent, No. 7935, and if so, with what result?

A. I have. It resulted in hardening the bat as described.

Q. 45. Please examine exhibit model No. 23, and state what the same represents.

A. It represents the machine described and shown in the patent and reissue to William Fosket before referred to.

Q. 46. Please examine exhibit model 24, and state what the same represents.

A. It represents a machine described in the English patent of H. A. Wells, No. 7397, and shown in the drawings thereof on sheet No. 2.

Q. 47. Please examine T. R. Williams' patent, (English specification,) A. D. 1833, No. 6387, figure 2, sheet 2 of the drawings, and state if you find in said drawing a fur-throwing mechanism and a pervious exhausted cone.

A. Yes, I do.

Q. 48. Do you find anything interposed between them, and if so, what?

A. I do. I find a deflector-plate or guide, against which the fur is thrown by the fur-throwing mechanism, and which directs the fur towards the perforated exhausted cone.

Q. 49. Examine exhibit 25, and state what the same represents, and how you know.

A. It represents the Burr and Taylor machine as described in the Burr and Taylor patent.

451 Q. 50. Please examine Exhibit model F, and state if you were examined as a witness in the case of H. H. Burr *et al. vs.* Cowperthwaite, in the district of Connecticut; and if yea, whether said model corresponds or differs with the machine of defendants in said case.

A. I was examined as a witness in the suit mentioned, and the model corresponds generally with the Cowperthwaite machine used in evidence in that case. The cheek or frame at the sides of the pickers in the machine used in that case did not project in front of the picker as it does in the model.

Q. 51. In the operation of said machine, was there any means of directing the fur-throwing mechanism on to the cone?

(Objected to.)

A. There was. The fur was directed towards the cone by the conjoint action of two picking cylinders, the upper one of which served to prevent the fur from being thrown by the lower picking cylinder upwards in the air, or over the back on the feed table; and to cause it to proceed in a horizontal sheet towards the cone.

Adjourned to 10 a. m. the 21st inst.

SATURDAY, *Sept.* 21*st*, 1861.

Counsel on both sides present

Q. 52. Is the mode of hardening bats described in Ponsford patent substantially the same or different from the mode of hardening bats set forth in the Wells reissue, No. 1086?

A. It is substantially the same.

Q. 53. Have you made a sketch representing the combination set forth in the fourth clause of the claim of reissue 1087? if so, produce the same and make it an Exhibit.

A. I have. Sketch "Exhibit 26" represents the devices set forth

in said claim, the pervious cone and exhausting mechanism being represented by pervious cone X.

Q. 54. Have you experimentally compared the action of a rotating brush and feed roller in the Burr machines with a carding
452 cylinder and a fan placed in a Burr machine as an instrument for disintegrating and throwing fur in manufacturing hat-bodies, and how do they compare?

A. I have. The fur is better disintegrated when presented to and blown by a fan from a card cylinder, than when thrown by a brush from nipping rollers. The card cylinder that I experimented with had a carding point.

Q. 55. You say in answer 20th that the hinged hood has a two-fold office. Under what circumstances are these two offices performed?

A. These offices are performed as follows: The first occurs in the use of a large cone; in that case the hinged hood is moved up and down during the formation of a hat-body to regulate the deposit of fur fibres upon the cone through a range of motion which a part of the time of forming a hat-body, [that is, when raised up to its highest point for the purpose of supplying fur to the tip of the cone,] leaves the upper part of the discharge aperture free and unobstructed by the hood. The second office occurs in forming hat-bodies on small cones; in that case the hood is moved up and down through a range of motion sufficient to vary the deposit of fur fibres properly, but in which the hood covers the discharge aperture more or less during the whole time of forming a hat-body, thus giving the trunk capacity, by varying the range of motion of the hood, to adapt itself to the use of various sized cones

Q. 56. Has the hinged flap any other office, excepting that mentioned in answer 20th?

A. It is used to vary the deposit upon the base of the cone, and when used enlarges the aperture by being thrown down to produce that result.

Q. 57. Examine "Exhibit No. 27," and state what that represents, and how you know.

A. It represents the model of the Wells patent of 1846, on file in the Patent Office. I know by having made a personal examination of the same.

Cross-examined by Mr. Gifford, counsel for complainant.

X. 58. Do you think that the loose tin boxes marked 18 B and 18 C appear to be better adapted to be used in such a machine as
453 is shown in figure 4 of the drawings of a certified copy of Williams's American patent than they are to be used in the machine represented by figure 6 of the said drawings?

A. That depends upon what the machine is to be used for. I do not think them better adapted to be used with a machine, as shown in the drawing (fig. 4) referred to for making a flat bat.

X. 59. Question repeated.

A. No; I did not before understand your question.

X. 60. Do you not think the loose tin boxes marked 18 B and 18 C

are better adapted to be used in a machine represented by said figure 6 than in a machine represented by said figure 4?

A. No.

X. 61. What do you suppose the small hole between the two large holes in the top of the part 18 C was intended for?

A. I suppose to receive the shoulder or step of a perpendicular shaft.

X. 62. Is there not in said figure 6 a perpendicular shaft represented in position adapted to that little hole?

A. I cannot tell by looking at the drawing. The cone-stand E is not represented in sections; the lower part of the shaft shown next to the upper part of the surface of the cone-stand has a conical shape, as if it might be stepped in a thimble of iron inserted in the floor of the cone-stand. There is, however, nothing in the drawing to indicate the presence of such a thimble, or to show that the shaft does not project down through the floor of the cone-stand.

X. 63. Your answer to the last question, that you could not tell by looking at the drawing, do you mean by that that you had anything else to tell from?

A. I understood the question to refer to the drawing exclusively, in comparison with the model, and so answered it.

X. 64. Question repeated.

A. I do not mean by that answer that I have anything else to tell from.

X. 65. Then what was the object of your statement under interrogatory No. 62, after your answer, "I cannot tell by looking at the drawings?"

A. Because I was referred to the drawing in the question,
454 and asked if there was not in said figure 6 a perpendicular shaft represented in position, adapted to that small hole; there is no hole in the drawing or no adaptation of said shaft to that hole.

X. 66. If you have any idea, state what you think that shaft or spindle in said figure 6 is for.

A. To connect the gearing represented with motive power for the purpose of driving or rotating the pervious forms represented on the cone-stand in figure 6.

X. 67. Don't you think that the said forms and spindle and gearing are pretty well adapted to Exhibit 18 C, and that 18 C is pretty well adapted to receive them?

A. 18 C is a representative model of a swiveling cone-stand, and is adapted, as far as it goes, for the purpose of receiving representative, rotating forms and the gearing to drive them, such as are shown in figure 6. As I have before stated, figure 6 does not show a section of the cone-stand gearing and parts, and it is impossible for me to say whether there is a particular adaptation of parts between the drawing and the model; but judging of the drawing as a mechanic understanding the adaptation of parts represented as intended to move in a particular manner, I have no doubt that the drawing represents a construction well adapted to be used with Exhibit 18 C.

X. 68. Have you exercised with the same attention and competency to judge of machinery from drawings, in your last answer, that you

have in the other parts of your examination where comparison between machinery and drawings has been included?

A. I believe I have.

X. 69. To arrange formers on Exhibit 18 C, to be rotated, it would be proper to have a shaft or spindle with gearing attached, to connect them with the bottom or platform of the former, would it not?

A. No. If the former were connected by the shaft—

(Counsel for the complainant objects to the witness volunteering any statements or dissertations not responsive to the questions.)

with the bottom or platform, they would not turn; they turn on journals or bearings in the platform; the shaft is the medium of
455 communicating power to them, and not the medium of connecting them to the platform of the cone.

X. 70. You mean, then, that the shaft or spindle is not in any way used in connecting them, do you?

A. No, I do not; it does connect the formers together, through the gearing.

X. 71. Then it would be proper to have a shaft or a spindle where one is represented in figure 6, would it not?

A. Yes.

X. 72. Is any provision made for such shaft or spindle to extend through the top case of model Exhibit 18?

A. No.

X. 73. Then, if the tin box, having a shaft or spindle where onei s represented in said figure 6, were put into that model, where you tried to put it on your direct examination, would it not require a hole to be cut in the case?

A. Yes, a hole big enough to let the shaft through.

X. 74. If the tin-boxes were so placed in model 18, what would have to be done after the machine was set in working order, excepting putting on the former, to put the formers on?

A. Nothing would have to be done, except to lift the top-case, if the machine was in working order, and to put the formers on.

X. 75. Would you then, to prepare for operation, put back the top-case?

A. Yes, if I used it.

X. 76. Where do you think the fur would be carried if it were then started?

A. To the pervious cones, if the machines were in working order, as assumed in the previous questions.

X 77. Would it form a bat, think, on the cones?

A. Yes, it would form bats on the cones.

X. 78. Good ones, think?

A. I can't tell how good they would be without trying.

X. 79. Have you exercised the same skill and judgment in giving your last answer as you have in the other parts of your examination?

A. Yes.

X. 80. If the tin-boxes, 18 B and 18 C, were put into model
456 18 A, in place of the tin-box which is under the perforated cylinder, what, if any thing, would have to be done to get the fan-shaft of 18 B down?

A. You would have to slip the key that holds a fan upon the shaft, in practical fans, and slip the shaft through the fan and bearings, so that it would not project beyond the sides of the exhaust-box.

X. 81. Please do not substitute another thing and answer with reference to that, instead of answering to the subject matter of the question. Confine your answer to the things which you have produced, and which are marked 18 A, 18 B, and 18 C, or something made like them.

A. You would have to unsolder the fan from the fan-shaft, and slip the shaft through the bearings, so that the end did not project beyond the sides of the exhaust-box, or else you would have to cut a slot in the floor of the machine, large enough to let it through.

X. 82. Well, having unsoldered and brought the box down, would your fan be in running order?

A. No.

X. 83. Well, what next would you have to do?

A. For what purpose?

X. 84. To get the thing so as it would go?

A. What thing?

X. 85. The thing with respect to which you have last answered and which you said you had unsoldered?

A. You would have to solder it again, or attach it in some way to the shaft.

X. 86. Would it be convenient to be got at to be resoldered?

A. No.

X. 87. What piece did you break, while on your direct examination, in model 18 A, in trying to get the box, as 18 B, and 18 C, down through the whole in which the perforated cylinder lays?

A. I broke two little pieces from the piece marked X with my name, in removing it.

X. 88. What was that to make room for?

A. For my hands, and the pieces 18 A and 18 B.

X. 89. Is not said hole narrower than the length of the box 18 B?

457 A. A little.

X. 90. If Exhibit 18 C were placed where you undertook to put it, and bats made upon formers, as you have stated, with a machine so arranged, would it not be necessary to remove the top-case X, whenever you wished to take out or put in a cone?

A. It would.

X. 91. In your examination in chief you stated that you saw at Mr. Burr's factory what was called the Wells machine, and that you asked to have it operated, and your request was not acceded to; were the pulleys in condition to operate the machine?

A. The pulleys on the machine appeared to be in condition to operate the machine, but there was no pulley on the main-shaft overhead in line with the driving-pulley of the machine; there was one on the driving-shaft in condition to operate the machine, except that it required to be shifted a few feet on the shaft, so as to bring it in line with the driving-pulley of the machine.

X. 92. Would it not have required the engine to be stopped to so have shifted the pulley?

A. I don't know. I did not examine to see whether this shaft was connected to the engine by gearing, or whether it could have been disconnected by running off a belt as usual.

X. 93. What do you suppose the stepped front-piece in model exhibit B, which, during the examination of some of the witnesses in this case, has been called mold-board, is in the machine for?

A. To strip the fur fibres from the picker, so that they may be thrown into the air in such a position as to be drawn by the exhaust upon the former, in properly regulated quantities to form a hat-bat of a proper thickness.

X. 94. In the piece in the model there are four of the steps on each side; what do you understand, if anything, to be the difference in the effect upon the fur between the lower one and the upper one, in the operation of such machine?

A. The only difference is a difference in the direction the fibres of fur take from them.

X. 95. Then you mean, I suppose, that they have no effect
458 upon the fur, but that the fur without their assistance going from them, differs in direction?

A. No, I do not mean that they have no effect upon the fur. I understood the last question to call for difference of effect.

X. 96. Effect produced by what?

A. Of effect upon the fur, produced by the upper step as contra-distinguished from the lower one.

X. 97. What direction would the two ends below the steps in that mold-board piece give to the fur?

A. The fibres would go in lines parallel to the side of the machine, and inclining downwards from a horizontal line.

X. 98. How would the direction given to the fur by the first step differ from the direction given to the fur by the piece below that step?

A. The difference would be that it would incline a little below the inclination of the line of the first step; it would go in a line parallel to the side of the machine; in these two answers I am assuming the question to relate exclusively to the direction given to the fur by the step-plate, unaffected by the exhaust or other influence.

X. 99. How would the direction given to the fur by the second step differ from the direction given to the fur by the first step?

A. In the degree of inclination downwards, which is not so great as by the first step.

X. 100. How does the direction given to the fur by the third step differ from the direction given to it by the second step?

A. In the degree of its inclination downwards, which is not so great.

X. 101 How does the direction of the fur, given to it by the fourth or middle step, differ from that given to it by the third step?

A. It differs by inclining upwards from a horizontal line, instead of downwards.

X. 102. Why does the fourth or top step incline upwards, if you know?

A. In order to direct the fur to some position in the air that it may be drawn on to the top of the cone by the exhaust.

X. 103. Why is the length of the top step less than the dis-
459 tance between the outer end of the next step below on one side, and the outer end of the next step below on the other side.

A. It has to be less, in the first place, in order to have a top step. I assume it to represent the width of a step necessary to strip from the picker-teeth such portions of the fur as are intended to be thrown by the machine into such position in the air as to be drawn by the exhaust on to the top of the cone; that portion being taken from the middle of the picker, the distance between the corners of the step on each side of course would be greater than the width of the top step, in order to have steps at the side to take the fur from the contiguous parts of the picker.

X. 104. What shape is it the object of that stepped piece, in an operating machine, to give to the current of fur?

A. The shape of a bent, flat sheet, struck up by an angular solid form; the front view of the sheet to represent two sides of a triangle having equal base angles; the side view of the sheet would represent the area of a triangle of the same kind.

X. 105. Is it the object of that stepped piece to so shape the current of fur that a vertical section of the current would approach the form of a section to some familiar form known to you, and if yea, what form?

A. No; the object of a stepped plate is, to strip the fur from the picker, and direct the fibres of fur in lines parallel with the sides of the machine, and radiating from about the plane of the axis of the picker, in a direction above and below a horizontal plane; the section of the bent sheet of fur so thrown, if taken immediately in front of the cone unaffected by the exhaust, would represent two legs of a triangle.

X. 106. Is that all it would represent?

A. I can give no better description in words, except to say it represents a sheet of anything of a given thickness, bent so that the section would represent two legs of a triangle.

X. 107. Do you think the top of such section of a current of fur would be sharp in the form of an acute angle?

A. No; I don't think there is anything sharp about it; I have used the figure as an illustration.

X. 108. Do you think the top of such section would be in the form of an acute angle?

460 A. The angle of intersection of the two sides of the sheet might be less than a right angle, if the sheet of fur travelled far enough from the picker.

X. 109. Do you think that the sides of the current of fur, shaped by the stepped piece, increases in elevation from bottom to top by steps similar to the stepped piece, all the way, after it is so shaped by the piece?

A. No; or I would have used, as an illustration, small right angle triangles disposed so as to give a general outline of a flat sheet bent in a triangular form in sections.

X. 110. The acuteness or obtuseness of the angle, at the top or the section of the current of fur, depends upon the hight of the center of the stepped piece, does it not?

A. No, it does not; it depends upon the angle of inclination of the different planes of the different steps taken as a whole. The center or middle part of the stepped piece might be much higher than the adjoining steps; and yet, if it had an angle of inclination downwards instead of upwards, the fur passing over its surface would travel downwards from a horizontal plane instead of upwards. The shape of the section of the bent sheet of fur, so far as any influence is exercised over it by the stepped piece, is determined by the planes of its surface.

X. 111. Answer without substituting what is not inquired of, and state whether, with two stepped pieces, the steps of one having the same inclination as the corresponding steps of the other, and one being higher than the other, in the middle, the tops of sections of currents of fur shaped by them, respectively, would be of the same angle, and if not, how would they differ?

A. There would be very little difference; the diameter of the picker being small, so that the only effect would be to raise the middle of the sheet by just the difference of the hight of the middle of the two stripper plates from the horizontal plane of the axis of the picker.

X. 112. What would be the difference in the shape of the current of fur shaped by a stepped piece converging nearly to a point at the top, and another current of fur shaped by a stepped piece, wider at the top than the other, the bases of the stepped pieces and the inclination of their corresponding steps being the same in each, and both the stepped pieces being the same hight?

461 A. The same general shape would be preserved if the stepped piece assumed in the question were made by a series of little steps instead of a series of a smaller number of bigger steps; but at the bend the sheet of fur might be a little thinner, if one could get at such a distinction precisely; theoretically, it would be the difference between bending two sheets of lead so that the sides would be at right angles with each other, but the angle at the exact point of intersection a little sharper or a little duller in one than the other.

X. 113 To what distance from the stepped piece do you suppose that what you called a rent sheet of fur maintains a surface constituting the inside of that bent sheet?

A. When not affected by the exhaust, several feet; about three feet, more or less, depending upon the hight of the picker, and t e general inclination of the sheet downwards.

X. 114. Well, I mean in practical operation?

A. I suppose it to have an under surface for two or three feet.

X. 115. Do you suppose that the platform between the cone and picker of a machine like model B has any influence in shaping the current of fur?

A. No, I don't think it has any influence on the shape of the current of fur; it may protect it from irregular drafts if there should be any.

X. 116. Then you think such a machine, without a platform and

with a cone mounted on an exhaust-box, in case there is no irregular drafts about, would work as well as with a platform, do you?

A. I don't see any reason why it should not at present; I have never tried it. If the picker is set as high or higher relatively to the cone, as in Exhibit B, and the stripper plate has proper angles of inclination of its surface, I don't think the taking away of the platform will make any particular differance.

X. 117. You have said that you think, in practical operation with a machine like Exhibit B, what you call a bent sheet of fur would maintain an inner side some two or three feet from the stepped piece; tell us how thick you think such sheet of fur would be at that distance from the stepped piece?

462 A. I cannot tell; it would depend upon the force of the exhaust, the width of the cone comparatively to the length of the picker, the degree of rapidity of which the fur was fed, the size of the machine, and its capacity for throwing fur to a greater or less distance, the relative hight of the picker from the base of the cone, and, in fact, so many elements would enter into the calculation that it would be impossible to tell, unless by experiment with a given machine.

Adjourned to 10 a. m. the 23d instant.

MONDAY, *Sept.* 23*d*, 1861.

Counsel on both sides present.

X. 118. Do you not think that in practical operation there would cease to be any inner sides before the current of fur would reach the cone?

A. Since answering the last question I have ascertained by a practical experiment, with a full-sized working machine, that there is a hollow under-side to the current, extending some distance from the stepped part in the middle of the stepped plate. The effect of the exhaust is to draw in the fur that passes over the long bottom step or plate towards the base of the cone, and the hollow is not very perceptible on the under side of the current where it reaches the cone so drawn in by the exhaust. I think the hollow becomes filled up by the fur drawn in by the exhaust by the time it reaches the cone; I think the inner side extends to some degree until the fur does strike the base of the cone.

X. 119. What is the difference between an inner side and an inner side to some degree?

A. Well, an inner side to some degree is an inner side; what I mean to say is, it starts with considerable of a hollow on the bottom side and runs down to a horizontal plane, where it intersects the base of the cone.

X. 120. What do you mean by running down to a horizontal plane?

A. I mean that the hollow under the current gradually lessens until it loses itself in the horizontal plane of the base of the pervious cone.

X. 121. How can the hollow lose itself in the horizontal plane of the base of the cone?

463 A. In the same manner that a hollow between two hills loses itself in the plane or flat surface between the two hills.

X. 122. When a hollow between two hills loses itself, as you call it, in the flat furface the hollow disappears, does it not, at that point?

A. Yes.

X. 123. Then if the hollow disappears the sides of that hollow also disappear with the hollow at that point, do they not?

A. Yes.

X. 124. Did you at your examination on Saturday, the 21st inst., possess knowledge or information sufficient to enable you to then answer as you have answered thus far this morning?

A. I did not possess so accurate information upon that particular point of the extent of the hollow under-side of the current. I believe that I qualified my answer.

X. 125. Did you not then believe that the hollow under the current of fur gradually lessens until it loses itself in the horizontal plane of the base of the pervious cone?

A. I had no belief on the subject.

X. 126. Do you think there is any substantial difference in operation between the curved front piece in model A and the stepped piece in model B?

A. Confining my answer to the effect of the piece itself upon the picker, I think there is no substantial difference, and, in making this answer, I assume the piece to have no planes of inclination towards the center of the cone from the sides of the piece; the piece is very small, and I can't tell exactly whether it has or not; I mean surfaces that would, unaided by the exhaust, direct the fur from the ends of the plate, or from points between the ends and the middle of the plate towards the middle of the cone.

X. 127. Answer the last question, assuming the curved piece to be a part of the machine, as it is represented in the model, and assuming also what you have assumed in your last answer respecting the inclination of the surface.

A. Taking the exhaust into consideration, I don't think there is any substantial difference in their mode of operation. The quantity of fur directed in any given direction would, of course, depend
464 upon the length of the stepped or plane surface over which it passed, opposite to the picker from which it comes.

X. 128. Did you not when answering the 126th question understand that you were to take the exhaust into consideration?

A. No; I supposed the question to refer—

(Counsel for the complainant objects to anything being volunteered by the witness after his answer to the question. The question does not inquire of him what he did understand, but only whether he understood he was to take the exhaust into consideration.)

—to the specific operation of each stepped or curved piece.

X. 129. You say, in answer to the 127th question, that you don't think there is any substantial difference in the modes of operation; why do you think there is not?

A In the operation of both of them a certain quantity or belt of fur is stripped from the middle of the picker and thrown into the air in such a manner as to be drawn, in properly regulated quantities, by the exhaust upon the tip of the cone. In the operation of both of

them a belt of fur fibres is stripped from the picker at each end thereof, and is thrown into the air in such a manner as to be drawn by the exhaust towards the base of the cone. In both the quantity of fur thrown into the air to be drawn respectively on to the base and tip of the cone by the exhaust depends upon the length of each of the zones of fur fibres stripped from the picker by the opposite surfaces of the stepped or curved plates. In both the inclination of the surfaces, opposite to the zones of fur fibres, determine the direction of the fur fibres into the air, where they are drawn by the exhausts on to the cone.

X. 130. Do you think either of those pieces is preferable to the other in operation?

A. Yes.

X. 131. Which one?

A. The stepped piece.

X. 132. Why?

A. Because it admits, practically measuring with greater accuracy, the amount of fur thrown from each part of the picker in any given direction.

465 X. 133. What was your object in getting up the model Exhibit No. 19?

A. To ascertain practically the operation of the Wells tunnel.

X. 134. Did you try that model in operation?

A. Yes.

X. 135. In connection with what machine?

A. In connection with a machine known as the Burr & Taylor machine. I substituted the tunnel "Exhibit 19," for the tunnel of the Burr & Taylor machine, using the casing around the brush, and a bottom board under the picker, so as to admit air behind the picker through a hole, as is usual in these machines.

X. 136. Were those experiments on what you call a Wells machine, of which you have testified in your examination-in-chief.

A. Yes.

X. 137. Do you think the delivery end of exhibit 19 is in the form or nearly in the form of a vertical section of a cone?

A. No; it is a narrow aperture, slightly conical in form, and the top flat and rounded off a little in the corners, to keep the fur from catching.

X. 138. Do you think the inclination of the straight sides towards each other make it slightly conical?

A. Yes.

X. 139. Does a figure formed of two straight sides inclining towards each other, and a straight end piece in each end, constitute a cone, or a representation of a section of a cone?

A. No; the sides would have to run towards each other till they both meet to present an end view, in the form of a section of a cone; in that case there would be only a flat bottom piece, and no top piece; there would only be three sides to the front view of the discharge aperture of the cone, instead of four, as now, if made in the form of a section of a cone.

X. 140. Did you suppose, when you got up model No. 19, that to

be within the direction of the Wells specification the delivery end of the trunk must be of some exact shape?

Witness is requested to answer this question without now referring to the Wells specification.

466 A. Yes; it had to be made in some exact shape, or else I couldn't make it.

X. 141. Did you suppose, when getting up that model, that to remain within the directions of the Wells specification the delivery aperture could be of only one particular shape?

A. Yes; I suppose that it was to be of the shape substantially as it would appear in a trunk made according to the drawings of the patent, and I so made it.

X. 142. Did you suppose, in getting up that model, Exhibit 19, that the description of the Wells specification limits the upward movement of the hinged flap to the plane of the bottom of the trunk?

A. Yes; I understood the specification to state that the hinged flap was designated by the letter Q on the drawings, and on referring to the drawings I found the hinged flap representing exactly as I have had it made in the model, and so hinged to the end of the bottom board as to make it impossible to move it above the plane of the bottom edge of the side boards and bottom board, although it may be moved up and down below such a plane.

X. 143. The hinged flap and bottom of the trunk are represented by continuous lines in the drawings, are they not?

A. No, they are not. There is a perpendicular line drawn across the lines representing the bottom board and hinged flap, which perpendicular line shows the place where the flap separates from the bottom board, directly over the axis of the hinge.

X. 144. Do you mean to swear that there is not a continuous line, extending from the small end of the trunk to the outer end of the hinged flap, representing the upper side of the bottom of the trunk, and the upper side of the hinged flap?

A. No, I do not; I mean to say that it is represented—(Counsel for complainant requests the witness to discontinue adding a statement to his answers which is not responsive to the question, as such practice is exhausting much time needlessly.)—as being severed by the perpendicular line of separation I referred to in my last answer.

X. 145. Look at the drawing of the certified copy of the
467 patent reissue No. 1087, exhibiting a side elevation of the trunk, and state whether the line representing the top of the bottom of the trunk and the top of the loose flap severs the perpendicular line showing the joint, or is severed by such perpendicular line.

A. The drawings show exactly what I have stated, two lines intersected by perpendicular lines and joined together by it; that is, the line showing the top side of the hinged flap Q*, runs horizontally until it gets over the axis of the hinge, and then goes down on a perpendicular to the axis of the hinge, to show the crack between the hinged flap and the bottom board, like the crack of a door closed.

X. 146. Now look at the drawing, figure 2, of the patent 1087 itself, and state whether you there find such perpendicular line.

A. No; there is no such perpendicular line there, and there is no hinged flap shown there for the want of it. The hinge, or what seems to have been drawn for a hinge,—

(Counsel for complainant objects to the witness wasting time and encumbering the record with long statements not responsive to the question, and begs that the defendants' counsel will instruct the witness that such course is improper.)

(Counsel for defendants request the witness not to say anything more in reply to a question than he thinks the question demands to render his answer, in connection with the question, intelligible.)

is represented as on the underside of a stiff, flat board in the figure 2 of the letters patent reissue 1087.

X. 147. With the specification and only said figure 2 of the drawings referred to, would you or not have made a hinged flap in exhibit 19?

A. Yes, I would.

X. 148. Look at said figure 2, and state whether a perpendicular line intersects the lines representing the top of the trunk?

A. Yes, it does.

X. 149. If you had followed the same rule for construction from the drawings in constructing and attaching the hood to model 19
468 that you did in constructing and attaching the hinged flap, would it have been so made and attached as to turn further down than the position in which it is represented in that drawing?

A. No; it would not have come down any further than shown in the drawing, but it would have come down in the same manner and direction as shown in the drawings.

X. 150. But you did make it so as to turn further down than its position shown in the drawing, did you not?

A. Yes, a little further in the same direction.

X. 151. Fixing the hood in the way you did, and the hinged flap in the way you did, was better adapted to illustrate your theory of the defense than to have had them otherwise, was it not?

A. It was better adapted—

(Counsel for the complainant requests a direct answer.)

for me to ascertain the operation of a machine as described and shown in the patent, which was the only motive I had in constructing the machine as I did, to construct it substantially according to the drawings of the patent, than to construct it in some other manner, not substantially in accordance with the drawings of the patent.

X. 152. Do you think in your model, Exhibit 19, you constructed your cam under the hinged flap in accordance with the drawings of the patent?

A. I intended to, and believe I did substantially. The cam on the model raises the flap as high as it will go, which is all any cam could do, and lowers it about in the proportion shown in the drawings of the patent.

X. 153. If the hinged flap had been constructed so as to rise higher

than the plane of the bottom of the trunk, would the cam, as constructed and attached in Exhibit 19, raise the flap above such plane?

A. No; there would have to be a little piece put upon it, the size of which would depend upon the degrees it was desired to raise it above the plane.

X. 154. Would putting the piece on it make it more or less like the one represented by the drawings of the patent?

A. A very little more like it.

469 X. 155. To give the one in Exhibit 19 the proportion to the one represented in the drawing how large a piece would you have to put to it?

A. About half an inch, as near as I can tell by rude measure, to the radius of the largest part of the cam.

X. 156. Is that the most correct answer that you feel competent to give to the last question?

A. Yes.

X. 157. Look at the model Exhibit 27, produced by defendants as a copy of the Wells Patent Office model, and at the delivery aperture of the trunk, and state whether the hinged flap of that model corresponds with the one you have put upon model Exhibit 19, in its adaptation to move up and down?

A. No, it does not; it is latched in position by a spring-latch, and has no lever or cam provided whereby to move it up and down, or to support it, as in model Exhibit 19, but it may be moved down from—(counsel for the complainant again objects to volunteer statements not responsive to the questions)—the position in which it is latched.

X. 158. In your volunteer statement under the last question, why did you not also include the adaptation of the Patent Office model of the hinged flap to be raised above the plane at the bottom of the trunk?

A. Because that has nothing to do with its adaptation for moving up and down, only to the extent of its motion, above or below a horizontal plane.

X. 159. To move up from below such horizontal plane to a point above such horizontal plane and back again must it not be adapted for such movement? I request a direct answer.

A. Yes.

X. 160. Is the hinged flap in Patent Office model Exhibit 27 capable of being so moved.

A. Yes, when unlatched.

X. 161. Do you suppose the proper time to work it would be when latched?

A. No.

X. 162. Is the hinged flap in model Exhibit 19 adapted to be moved as specified in the question 159?

470 A. No; it stops when brought up against the bottom edge of the sides, as shown in fig. 3 of the drawings of the patent.

X. 163. Had you not seen the Patent Office model at the time you got up the model for Exhibit 19?

A. Yes.

X. 164 If you were directed to hinge a flap to the bottom of the

trunk at the delivery aperture to turn up and down to direct the fur, and were to know that on some occasions the fur ought to be directed by such piece higher than the plane of the bottom of the trunk, would you arrange the hinge flap as it is done in model Exhibit 19?

A. Not if I were directed to turn it up from the plane of the bottom of the trunk.

X. 165. In answer to the 21st interrogatory-in-chief you say that in the Wells machine there is a curved plate behind the brush upon which the fur is brushed or laid by the brush cylinder, after it is taken from the nipping rollers. Does the specification in the patent say anything about brushing or laying the fur *upon* any such curved plate?

A. It does not say they are brushed on the curved surface specifically; but it does say that they are brushed and properly laid as they are first presented by the downward action of the brush, and the drawings show the brushes to run a little closer to the curved plate than to the nipping apparatus, so that the brushing action must take place on the curved plate if exercised on the fur when first presented, as the curved plate is close to the nipping bars.

X. 166. Did you have a brush to brush the fur upon the curved plate in the experiments you say you tried in the Wells machine?

A. I used a brush, but it did not brush the curved or back plate, it was a little distance from it; in that respect I followed the construction of the machine shown to me by Mr. Burr as the Wells machine.

X. 167. Have you given your testimony under an assumption or supposition that to come substantially within the operation of the Wells machine the fur must be brushed upon the curved plate?

A. No.

471 X. 168. Is a bow-string, according to your judgment, substantially such a thing as a cylindrical picker or brush?

A. Not in itself.

X. 169. Does a bow-string operate substantially like a rotating picker? Please give a direct answer.

A. It does not; one is twanged, and the other is rotated to seize and throw the fibres of fur.

X. 170. You say, in answer to the 31st chief interrogatory, that when you formed a bat with the hood thrown back it was too thick at the tip; what do you suppose would have been the effect upon the tip of the bat of substituting a higher perforated cone than you had?

A. The tip would have been a little thinner, the fur would have been divided over a little larger surface, but the bat would have then been thicker at the square than near the brim or tip.

X. 171. In your answer to the 37th chief interrogatory you furnish sketches, Exhibit 21 and Exhibit 22, which you state you made; what was the object of making those sketches?

A. They were originally made to be attached to an affidavit to be made by me in this suit, to be used on the hearing of motions for a preliminary injunction. The object was to show, in a brief sketch, an exhibition of the operative devices mentioned in claims 2, 3, and 4, of reissue 1087, as explained in my direct examination.

X. 172. What fact, if any, were they intended to illustrate or establish, or to aid in illustrating or establishing?

A. The appearance of an assemblage of the elements of the machine mentioned in the three claims, respectively, when divested of the elements not specified in the claim, and the want of co-operative organization in the elements specified in the claim, for the purpose of producing a practical combination of parts.

X. 173. What effect or result was representing such appearance of those elements expected to have, or designed to have?

A. To show that the claims specified did not specify sufficient elements to make a practical combination of any kind, so far as Exhibits 21 and 22 are concerned.

472 X. 174. Who was the author of the plan of representing such appearance?

A. I was the author of the plan of showing how those things would look divested of the trunk.

X. 175. I understand you to say, in your answer to the 38th interrogatory, that you took off the trunk and held a piece of pasteboard in the air when the hood was where the trunk was on, and at other places between the picker and cone; what was that intended to show?

A. It was done to satisfy myself, by actual experiment, what the effect would be of trying to use the hood without the trunk.

X. 176. Was it a mere curiosity which you wished to gratify?

A. No.

X. 177. You also say that you then held a hinged flap, of the size and form described in the Wells patent, between the brush and base of the cone; what was the object of that experiment?

A. To satisfy myself, by actual experiment, of what would take place with the hinged flap so held without the co-operative aid of the trunk.

X. 178. Why did you desire to be satisfied of that?

A. Because I wished to know certainly.

X. 179. What use did you expect to make of such knowledge, or knowledge thus acquired?

A. I did not expect to make any use of it.

X. 180. Who did you expect to make use of it?

A. Mr. Harding told me that he would ask me concerning it on my examination. I supposed he would make such use of it as he thought best.

X. 181. Is it your opinion that for two parts of a machine to be in organized combination with the machine they must touch each other?

A. No; it is not.

X. 182. Do you mean to be understood as saying that the Wells description is insufficient to enable a machinist acquainted with the art to construct a machine therein set forth?

A. No; I think it is sufficient, taking the specifications and drawings together.

473 X. 183. If you were directed to make a stool having three legs, and were told where to put the legs, each of them, and the drawing at the same time were handed to you to aid you, and the

drawing should represent but two legs, which would you feel bound to follow, and how many legs would you put into the stool?

A. I should put in three if I was told to put in three, particularly if a stool would not stand up with two.

X. 184. You say that you tried an experiment by placing a candle under the picker. How far was the exhausted former from the candle?

A. As near as I can get at it now, a little over four feet—perhaps four feet and a half, somewhere thereabout.

X. 185. Do you know how strong the exhaust was?

A. No. It was running as usual with a Burr and Taylor machine, with a cone on, the trunk taken off and the brush still.

X. 186. You mean as it was usually run when the trunk was on, do you not?

A. Yes, I mean at the same speed; so far as I know, I used the same means to run it.

X. 187. It would take a stronger exhaust to draw the air from a given distance without a conductor than it would through a conductor, would it not?

A. It would if the aperture of the conductor were placed close to a pervious cone, as in the Wells, Burr and Taylor machine.

X. 188. In your answer to interrogatory 42 you say that you do not find in Exhibit A or Exhibit B mechanism for blowing the exhaust air from the former into a chamber for substantially the purpose or in substantially the manner described in the Hopkins patent. In giving that answer, what did you assume to be the purpose of conducting the air from the exhaust box or fan to blow the picker in the Hopkins machine?

A. I assumed the purpose to be to blow it through the chamber past the picker, and through the trunk to supply the picker and trunk with air, inasmuch as the ordinary air hole for that purpose is stopped up by the air chamber, and the machine requires a supply of air to operate it practically.

474 X. 189. If what you call the air chamber were not there in the Hopkins machine, would not the picker be supplied with air without that from the exhaust?

A. Yes, if the air chamber was taken away, there would be a hole there for the air to come in to the picker and trunk.

X. 190. Then you mean, do you, that the putting of the air chamber there was to both cut off a supply of air, and to introduce a supply of air to the picker, do you?

A. Yes. I mean to cut off the supply of air through the hole that would be induced by the exhaust and the rotating picker, and in place thereof to blow the air that enters through the pervious cone past the picker and through the trunk.

X. 191. After the air gets past the picker, what does it do to the fur in the Hopkins machine?

A. Guided by the trunk, it carries the fur to the end thereof, and drives it against the pervious cone which some of the air enters, thus going round in a circle.

X. 192. Didn't you know that the words "guided by the trunk," in your last answer, were not responsive to the question?

A. No; because the question asked what the air did to the fur, and the first thing it would do to the fur would be to sling it against the top side of the trunk, which would then guide both fur and air.

X. 193. Is not the action of the air on the fur which is brought from the exhaust past the picker in the Hopkins machine to raise or hold up the fur?

A. It keeps it suspended within the trunk.

X. 194. What did you say "within the trunk" for when the question referred only to the action of the air upon the fur?

A. Because if it were not for the trunk, and for the casing above the picker, the air from the air chamber, when it didn't blow in a direction down towards the floor, would follow the rotation of the picker or be diverted by it from a straightforward direction, and go off from the picker at some point upwards from the picker, or backwards from the picker, as the fur would go were no air blown underneath it; but were it left to take its supply from the open air
475 without the trunk casing. The fur would go up in either case without the trunk and upper casing.

X. 195. Question 193 repeated, and a direct and responsive answer requested.

A. So far as it acts without the trunk to guide it, I do not think it is.

X. 196. Question repeated.

A. As the machine is organized, it is.

X. 197. Is not the effect of the action of the air upon the fur which is conducted from the exhaust past the picker in model Exhibit A to raise or hold up the fur as model Exhibit A is organized?

A. There is no air in model Exhibit A to conduct it from the exhaust past the picker-teeth as in the Hopkins patent. The air from the exhaust blows out at a place between the picker and the cone. I cannot, therefore, answer the question, as I understand it to assume a thing that does not exist.

X. 198. Does not the conductor which conducts the air from the exhaust on its way come up under the picker?

A. Yes; but not behind the picker, and it opens in front of it, and underneath the picker casing which intervenes between the opening of the conductor and the picker.

X. 199. Why did you volunteer the statement under the last question which follows the word "but," it not being responsive to the question?

A. I made the answer to say exactly how I understood the air to come and be delivered in relation to the picker.

X. 200. Why did you want to say where the air was delivered, when the question made no inquiry about that?

A. Because the question assumed that the conductor came up under the picker, whereas it takes a bend and discharges in front of the picker.

X. 201. Don't you know that question 198 inquires whether the conductor comes up under the picker, and that it does not assume any such thing?

A. I understood it to assume what I have stated in my last answer, and endeavored to state how it did come up and discharge.

X. 202. Don't you know that so far from that question as-
476 suming that the conductor came up under the picker, that it put that very thing as a question to you, and that you answered yes to it?

A. I know it does ask it in the form of a question, which, from its very nature, being asked of a model before my eyes, contains an assumption that it does come up below the picker, to which I agreed in my answer, and further stated where it went to, in order that I might not be understood to say that it discharged under the picker.

X. 203. What direction does the air go from the exhaust in model Exhibit A, after it comes up under the picker?

A. So much of the air as does come up through the conductor from the exhaust-box to the hole in front of the picker takes a direction inclining upwards from its place of discharge, and may receive a greater inclination upwards by means of the shutter. The air conducted from the exhaust-fan in Exhibit A does not all go through the conductor, or any considerable portion of it, but blows out of a hole marked on the bottom of the floor of the model or out of side passages provided for it to go through.

X. 204. Why did you add the statement under the last question commencing with the words "conducted from," when nothing of the kind is inquired of in the question?

A. Because I understood the question to assume that the exhaust air in model A came up under the picker, or was conducted up under the picker.

X. 205. Do you exercise the same judgment in trying to understand the question that you do in trying to give your answer?

A. I try to understand the questions, and endeavor to use my best judgment both in understanding them and answering them plainly.

X. 206. Is the effect of the action of the air conducted from the exhaust to the orifice below and in front of the picker upon the fur, to raise or keep up the fur in machines like model A?

A. That is the result of its action to a greater or less degree when used.

X. 207. Did you suppose I inquired of you what the effect of its action when *not* used?

477 A. No.

X. 208. Why then did you add to your answer 206 the words, "when used?"

A. Because I have seen such machines run, and the fur kept up without its being used, and didn't wish to be understood to say that the fur was kept up by its action, in the broad sense of the term kept up, when I know it only helps or assists in keeping up the fur when used.

X. 209. What do you suppose that a conductor in a machine like Exhibit A, extending from the exhaust to the aperture below and in front of the picker, is for?

A. To conduct air.

X. 210. For what purpose?

A To be discharged into the air in front of the picker, and assist in sustaining the fur when required.

X. 211. Is there not a movable piece in that conductor in model A?

A. Yes.

X. 212. What do you suppose that it is there for?

A. One of its purposes appears to be to cut off the supply of air substantially. It is a rude damper, and may be used to regulate the supply of air passing from the exhaust-box.

X. 213. Is there not a movable piece which, when opened, opens a communication between the interior and exterior of the conductor in the Hopkins machine, which conductor extends from the exhaust to the opposite delivery end of the conductor?

A. Do you mean in the model here or in the patent?

X. 214. I mean the Hopkins model.

(Objected to by defendants' counsel, because it is immaterial whether there is anything in the Hopkins model or not, the proper question being whether there is such a thing in the Hopkins patent.)

A. There is a damper in the model, Exhibit B, which opens a hole from the conductor into the open air, so that the air can blow out into the open air.

X. 215. Is not the movable piece at the delivery end of that conductor in the Hopkins machine which will diminish or enlarge the delivery aperture?

478 A. Yes; there is a hinged piece or valve that will do it.

X. 216. Is there not a movable piece in the delivery aperture of the air conductor in model Exhibit A, which, by being moved, enlarge or diminish that delivery aperture?

A. No; it shuts over it. I didn't alter the size of the delivery aperture at all.

X. 217. Suppose you close that movable piece over that delivery aperture, you mean then that the delivery aperture will be as large as it was when the movable piece was open, do you?

A. It will make no difference in the size of the aperture; it will only be shut up.

X. 218. Was your answer next before the last given with the same candor that your other answers have been given in this deposition?

A. Yes; I have endeavored to state exactly what I believe to be the functions performed by the mechanism inquired of.

X. 219. Do you not know that the effect of opening and closing the movable piece at the delivery end of that air conductor in model Exhibit A is to let a larger or a smaller quantity of air through?

A. Yes; when opening and closing, but a little beyond opening and closing it can be moved to a considerable extent downwards, without producing any increase on the quantity of air blown out.

Adjourned to the 24th at 10 a. m.

SEPTEMBER 24*th*, 1861.

Counsel for the respective parties present.

X. 220. Do you think the part of the air conductor nearest the picker any less a part of the conductor of the exhaust air because it's

enlarged at that place, and called in the Hopkins specification an air chamber?

A. Not anything less, but something more than a conductor, as described and shown in the Hopkins patent; it is there described as a chamber.

The witness's attention is here called to the question, and he is requested not to volunteer an answer, as the question calls for a direct answer.

479 (The witness continues.) It is there described as a chamber or reservoir which receives air from two sources, one from the exhaust, and the other from the picker, and has a capacity to unite and concentrate or combine the forces of the different currents of air described as being admitted to it.

X. 221. Does not the current of fur in the model Exhibit A receive air from two sources?

A. Yes.

X. 222. Is not one of those sources the picker?

A. No; the open air operated on by the picker, and driven thereby towards the cone, without passing through any intervening chamber.

X. 223. Is not the other of those sources the delivery end of the conductor of exhaust air?

A. It comes through that end, but, as I have said before, all the exhaust air, or the air passing through the cone, does not so discharge

X. 224. Does not the conductor of the exhaust air, extending from the exhaust fan-box, widen as it approaches the pickers in the Hopkins machine?

A. Not preceptibly in the patent; it is a pipe merely to an air chamber from the exhaust-box through which the whole exhaust air is blown, as described in the patent.

X. 225. Does not what you call a pipe enlarge as it approaches the picker to form what you call the air chamber?

A. No; the patent says, "Below this picker I have a recess (a,) which I call an inclosed air chamber; this chamber communicates by a trunk or pipe E with the exhausting-fan, hereafter described;" there is a small hole shown in the drawing of the chamber, representing a small round aperture opening into the side of the chamber, which is in the position of an aperture that an entrance might be made by the pipe E, or some other pipe, into the chamber.

X. 226. Following the Hopkins specification, and with a knowledge of the state of the art at the date of his patent, would you make what is called the air chamber larger or smaller than the pipe E?

(Objected to.)

480 A. Following the direction of the Hopkins patent, I should make it as near as possible in conformity with the drawings of the patent, and adapt to receive, by an additional aperture, currents of air from wings at the ends of the picker; but if I relied upon my knowledge of the state of the art before the patent, and wanted to build a machine that would work, I would leave out the air chamber altogether, as a superfluity, and also the pipe leading to it, and let the exhaust blow out into the open air, so that it would

have capacity to hold the bat upon the cone, which it would not if chocked by the small pipe E, which the patent describes as being the medium of conducting the air—

(Counsel for the complainant objects to the witness making any longer speech which is not responsive to the question.)

—that passes through the cone to the air chamber.

(The volunteer statements of the witness is objected to by the complainant's counsel, and the last question is repeated, and a direct answer is requested.)

X. 227. Question repeated.

(Objection continued.)

A. As I said before, if I followed the specification, I would make it larger, like the air chamber in the patent; but if I followed my knowledge of the state of the art I should not put such a thing there at all, because I know that it would not work in connection with the machine as described and shown in the patent.

X. 228. Do you mean to swear that the machine constructed according to the Hopkins specification, with the conductor of the exhaust air and with the exhaust fan-box constructed in the usual way, would not work?

A. I mean to say—

(Counsel for complainant calls for a direct answer.)

It is impossible to give a direct answer to such a question. The question proposes a departure from the Hopkins patent mode of conducting the air from exhausting mechanism under a pervious cone. The ordinary mode is to blow it out of a large hole in the bottom of the exhaust-box under the floor. But the patent says: "The exhaust-fan G is a well-known device for exhausting the air from the cone upon which the hat-body is formed, and the air passing
481 into it is driven forward into the air chamber above named." The patent also says: "This chamber communicates by a trunk or pipe, E, with the exhausting-fan hereafter described." There is no way described or shown in the patent of making any vent from the exhaust-box other than the pipe E, and no way described or shown to regulate the force of the current passing through the pipe E and air chamber, except by the valve in the chamber, which if closed would stop it altogether, and prevent any air from passing into the cone.

X. 229. If you were to construct an exhaust-fan in the usual way, would you not have a hole in the bottom for the escape of the air?

A. Yes; I said so in my last answer.

X. 230. Could you not have such hole and also a conductor communicating with the interior of such box at another place?

A. Yes, by another hole I could, but then—

(Counsel for complainant requests the witness, having answered the question, to not follow his usual practice of volunteering a statement not responsive to the question, and informs the witness that the course he is pursuing in that respect will show the court that it is that course which is causing this deposition so much space and time.)

when that was done, I would not have an exhaust-box constructed in the usual manner.

X. 231. But you would have an exhaust-box constructed in the

usual manner, with the addition of the conductor communicating with it, would you not?

A. No; I would not to have the conductor communicate with the exhaust-box made in the usual manner; it should communicate by means of the usual hole, and not by an additional one.

X. 232. You have said that you know a machine would not work constructed and described by Hopkins, inclusive of the conductor and chamber for exhaust air; have you tried such a machine?

A. No, I did not try it. I was making preparations to try it—

(Counsel for complainant states to the witness that he is not asking about preparations, and as he has answered the question, to desist from making an additional statement.)

482 when I found by examining the force and quantity of the exhaust air that it would be an absurdity to try an experiment, because the pipe E would either choke the exhaust so that it would not hold the fur upon the cone, or if made big enough to take the air passing from the fan without choking the fan would blow the bat from the cone all over the room.

X. 234. You mean such would be the effect in case the exhausting-fan box had no hole for the escape of air except a conductor, do you not?

A. Yes.

X. 235. In machines like Exhibits A and B, does not the hardening cloth move up and down?

A. Yes.

X. 236. Is it not in contact with the bat when moving up and down?

A. It is.

X. 237. Is not that for the purpose of hardening the bat?

A. The hardening cloth is for the purpose of hardening the bat when operated in a proper manner.

X. 238. Is not the movement of the cloth up and down in contact with the bat for the purpose of hardening the bat?

A. It is one of the motions of the hardening cloth used for the purpose of hardening the bat.

X. 239. Does not the cloth, while being moved up and down against the bat, have another motion?

A. The surface of the cloth has.

X. 240. Can the surface of the cloth have the motion without the cloth having it?

A. Yes, as I mean it; the surface of the pond may have motion without the pond itself moving; that is the motion I mean when I say the motion of the surface.

X. 241. In the Hopkins machine do the hardening rollers move up and down?

A. Yes.

X. 242. Is not that motion for the purpose of hardening the bat?

A. It is one of the motions of the rollers described as being used for hardening the bat.

X. 243. Have not the rollers also another motion while being moved up and down?

483 A. Yes, they turn upon the axis rolling upon the surface of the bat.

X. 244. Is not the cloth in Exhibits A and B which is moved up and down, and which also has another motion, a concave surface when and where so acting upon the bat to harden it?

A. No, the cloth is a straight flexible cloth, and is not formed in a concave surface by gores or seams, as a cap; it is an adaptable surface like every other cloth, but cannot be said to have a concave surface at any time.

X. 245. At the time the cloth is acting upon the bat to harden it, is not the cloth bent where it touches the bat?

A. It is not bent, cloths are not bent as metals are. It is simply drawn to the surface of the bat; when taken from the surface of the bat its condition is not changed by having been in contact with the surface of the bat.

X. 246. How large a surface of the cloth is drawn against the bat while the hardening is going on in a machine of that kind?

A. A part of the middle of the cloth between the two, varying according to the size of the cone on which the bat is

X. 247. Is the cone and bat of a convex surface, where the cloth is so drawn upon the bat?

A. The cone has, and the bat is formed to fit the cone.

X. 248. If a surface be drawn or pressed upon a convex surface so as to fit that convex surface, what do you think would be the form of the surface so in contact with the convex surface; would it not be a concave surface?

A. It would if it were in the form of a concave surface, but a surface to be in the form of a concave surface and made out of cloth must have gores and seams in it, like the sleeve of a coat, a cap, a cover of a ball, if made of felt like a bat; of course it can be made in the form of a concave surface by drawing on the fibres on a convex surface.

X. 249. While the cloth is being operated upon the bat to harden it is the exhaust on or off?

A. It is on

X. 250. Is the bat formed upon the perforated cone?

A. Yes.

484 *Re-direct.*

Q. 251. You stated in your cross-examination (question 146) that there was no perpendicular line intersecting the lines representing the bottom of the trunk at the hinge of the lower hinge-flap in figure 2 annexed to the patent; did you understand that question as limiting you to figure 2, in making your answer?

A. Yes, I did.

Q. 252. Answer that same question, referring to fig. 3 annexed to the same document; that is, state whether you find such a perpendicular line intersecting the lines representing the bottom of the trunk at the hinge of the flap?

A. Yes, I do.

Q. 253. Taking all the drawings and the document together, are you or not of opinion that the hinge-flap is correctly represented in model Exhibit 19?

A. Yes; it is correctly represented, according to the drawings and specification.

Q. 254. Will you please mark on the side of Exhibit 19 a line marked A B, indicating the position of the rear line of the hood, which will indicate its position when the hood itself is depressed to the point shown in the drawing fig. 3 of the patent itself, 1087?

A. I have marked a rear line, which places the hood at the same angle as shown in the drawing in the patent, fig. 3.

Q. 255, Does the gearing which operates said hood indicate that it is to descend any lower?

A. Yes; the eccentric is not represented at its full stroke.

Q. 256. Does it indicate that it is to rise any higher?

A. Yes; for the same reason.

Q. 257. Will you mark on the sides of the trunk two lines, C D, showing what would be the line of the lower edges of the trunk at the hinge-flap if you had followed the Patent Office model instead of the drawing in constructing that portion of Exhibit 19?

A. I have.

Q. 258. Have you made a cam which would be nearer to the cam in the drawing of the patent, in accordance with your answer of yesterday, when your attention was called to the cam under the
485 hinge-flap in fig. 2 by Mr. Gifford? if so, produce said cam and mark it Exhibit 19, Appendage F.

A. I have, and I produce the cam, and marked it Exhibit 19, Appendage F.

Q. 259. Will you examine Exhibit E in reference to the hinge-flap, and state whether it corresponds with either the drawings annexed to the patent or with the Patent Office model?

A. It corresponds with neither.

Q. 260. Point out the difference.

A. In the drawings of the patent the hinge-flap is shown only to hinge downwards, and is so placed that it can not move above the horizontal plane of the bottom board of the trunk. In the Patent Office model the hinge-flap moves both above and below the plane of the bottom board. In the model Exhibit E the hinge-flap has only a motion upwards from the plane of the bottom board. In both the Patent Office model and the drawings of the patent the hinge-flap is hinged to the end of the bottom board. In model Exhibit E the bottom board is not cut off, and there is a copper bottom which extends in front of and under the hinge-flap. In the drawings of the patent the hinge-flap is represented as a flat piece of board. In model Exhibit E it is turned up at the corners. In model Exhibit E the hinge-flap is capable of being raised perpendicularly, or nearly so, and thrown over backwards within the trunk, whereas, in the drawings of the patent, as I have before said, it cannot move above the plane of the bottom board; and in the Patent Office model the angle of inclination is comparatively limited by the sides. In the Patent Office model the hinge-flap is held in one position by a latch, and has no

cam to move it as in the drawings of the patent; but in the model Exhibit E the hinge-flap rests on the bottom board, when not raised up by the cam, in which it differs from both of them.

Q. 261. Is there any direction in the Hopkins specification to conduct the air from the exhaust cone to any other place than the air chamber?

A. There is not.

Q. 262 You were examined in reference to a damper shown
486 in the Hopkins model, where the exhaust communicated with the outer air; is there any such damper in the Hopkins specifications?

A. No.

Q. 263. What difference, if any other than this, do you perceive between the Hopkins model and the specification?

A. The mode of letting the pipe E into the air chamber is different, the trunk is different, the patent does not show a bifurcated trunk; the jigger-rollers are different; in the patent they are represented as rollers of an ordinary kind, setting on a fixed axis; in the model they are loose sleeves rolling on their periphery, and having no fixed axis; in the patent the rollers are represented as having an end-chase by means of indentations and flat surfaces alternately dispersed; in the model the spindles, on which the the loose conical sleeves turn, will move up and down whether the rollers do or not, unless the rollers happen to rest upon the flange at the bottom; the drawings of the patent show wings on the picker, which are not in the model.

Q. 264. Why did you in constructing Exhibit 19 follow the drawings, as you say you did, instead of the Patent Office model.

A. Because the Patent Office model is very rude and imperfect, and the drawings of the patent represent a working machine.

Re-cross.

X. 265. You have stated that the gearing which operates the hood indicates that it is to descend lower than is shown in the drawing; does not the gearing or cam in the drawings of the patent indicate that the hinge-flap or lower deflector was to ascend higher than the position which said flap or lower deflector is represented to be in the drawings?

A. Not necessarily; the cam is operated by hand, and has a given extent of motion, as is the case with the motion of the eccentric, which moves the hood a given distance up and down at every stroke; the cam is large enough in the drawing to raise the hinge-flap a little higher than it does raise if the construction would admit of it, but it is not necessary that it should do so, and the drawing represents
487 the hinge-flap held up to its place by the cam, the handle of which operates as a weight to keep it in position.

X. 266. Do you not know that the eccentric may act when connected to the hood ready for the operation, even if the hood be not constructed to have the same range of motion that would be given to

it by the operation if so constructed that it might be moved to a greater range?

A. One way it would, and the other way it would break the string. When it would not break the string, it would slack it up; the eccentric would not be doing anything at all then in the way of moving the hood.

X. 267. Do you think the eccentric necessarily shows that the hood was to descend any lower than the position which is shown in the drawing; that is, would it not work if the hood were so made as not to descend any lower than its position in the drawing?

A. It would work as I stated in my last answer, by slackening the string at one extremity of its stroke, but that is not the way provided in the patent for producing a motion varying from the natural operation of an eccentric. The patent says: "When it is desired to still further diversify—

(Counsel for complainant here objects to the witness wasting time by reading from the patent, which is in evidence, and requesting him to desist and not wilfully persist in such a course, as it is only multiplying copies of documentary matters on the records of this suit; and it is not responsive.)

—the distributions of the fur fibres, other means can be substituted for the eccentric," and refers to an apparatus shown at figure 5 in the drawing, for the purpose of producing other motion than would be produced by the operation of an eccentric. I do think that the eccentric in the drawing shows that the hood was to descend lower than the position in which it is shown in the drawings.

X. 268. Do you think also that the fact that the lower deflector in model E is so hinged that it could be turned over backwards important?

A. Yes, because it is so hinged as to be raised above the flap of the bottom board, as shown in the drawings of the patent.

488 X. 269. Then, according to that, you think it could not be hinged so as to raise above the plane of the bottom board unless it was so hinged that it could be thrown over backwards, is that so?

A. No.

X. 270. Do you not understand from the drawings in Hopkins' patent that there is a shutter at the delivery part of what is called the air-chamber so arranged as to open and close?

A. Yes, I do understand so, and have answered it to be so during my examination, and that it hinges as shown in the model, Exhibit D.

F. C. TREADWELL, JR.

Subscribed and sworn to before me, this 24th September, 1861.

R. E. STILLWELL,
U. S. Commissioner.

489 Mr. Harding offers in evidence receipts of the complainant for the quarterly portion of the license fee, under the agreement set out in the bill of complaint, from the date of the execution of the license down to and including the quarterly receipt, dated June

30th, 1860, in full, for license fee to July 1st, 1860, and the receipt, dated September 29th, 1860, for license fee to September 30th, 1860, which are admitted by complainant's counsel.

Mr. Harding gives in evidence a certified copy of letters patent of E. F. Condit and Alfred Taylor, March 19th 1850, marked Exhibit No. 16.

Also, Wells, James & Peck's patent of September 20th, 1837, marked Exhibit No. 17.

Also, Wells, James & Peck's patent, September 22d, 1837.—Defendants' Exhibit No. 18.

Also, H. A. Wells's patent, 11th September, 1841.—Defendants' Exhibit No. 19.

Also, H. A. Wells, 18th September, 1841.—Defendants' Exhibit No. 20.

Also, certified copy of statement of H. A. Burr and A. B. Taylor on the application for an extension of letters patent marked defendants' Exhibit No. 21.

(Counsel of complainant objects to the admission in evidence of the copy of the statement offered by defendants' counsel, upon the ground that the subject matter of it is not relevant, and is not admissible in evidence; and farther, that it is not sufficiently authenticated to make it evidence, nor any part of it; and also upon other grounds.)

William Fitch, being called and sworn on the part of the defendants, deposes and says:

Q. 1. What is your name, age, residence, and occupation, and in whose employ are you, and in what capacity?

A. William Fitch; age, 33; residence, New York; occupation, accountant; in the employ of Duryee, Jaques & Co., in that capacity.

490 Q. 2. Have you ever made any tender, on behalf of defendants, to H. A. Burr of a license fee to use the hat-forming machine, and if so, when have you made such tender, and where, and what result?

A. I have; I made such tender on the 31st day of December, 1860; March 30th, 1861, and July 1st, 1861, at the office of H. A. Burr, in Frankfort street, New York; each time tendering one hundred and twenty-five dollars in American gold, which was uniformly refused.

WILLIAM FITCH.

Subscribed and sworn to before me this 21st September, 1861.

R. E. STILWELL,
U. S. Commissioner.

491 A. D. 1833. No. 6387.

Artificial Skins—Williams' specification and disclaimer—Specification.

To all to whom these presents shall come:

I, Thomas Robinson Williams, esquire, late of Norfolk street, Strand, in the county of Middlesex, but now of No. 14, Lamb's Buildings, Bunhill Row, in the said county, send greeting.

Whereas, his most excellent Majesty, King William the Fourth, by his letters patent, under the great seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminister the fourteenth day of February, one thousand eight hundred and thirty-three, in the third year of his reign, did, for himself, his heirs and successors, give and grant unto me, the said Thomas Robinson Williams, my executors, administrators, and assigns, his especial license, full power, sole privilege and authority, that I, the said Thomas Robinson Williams, my executors, administrators and assigns, and such others as I, the said Thomas Robinson Williams, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time, and at all times during the term of years therein epxressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the town of Berwick-upon-Tweed, and also in all his said Majesty's colonies and plantations abroad, my invention of "a new combination of fibrous materials, forming, by means of machinery, artificial skins, which may be applied to the purposes for which skins, leather, vellum, and parchment are now used;" in which said letters patent there is contained a proviso that I, the said Thomas Robinson Williams, shall cause a particular description of the nature of my said invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, to be enrolled in his said Majesty's high court of chancery within six calender months next immediately after the date of the said in part recited letters patent, reference being thereunto had, may more fully and at large appear.

492 Now know ye that, in compliance with the said proviso, I, the said Thomas Robinson Williams, do hereby declare the nature of my said invention to consist in a new combination of fibrous materials, forming artificial skins by means of machinery. I suspend fibrous materials in air instead of water; and I draw, deposit, and lay the same on woven or perforated sheets or forms of metal, wood, or cloth, by means of a partial exhaustion of the air under or on the opposite side of the same. I dip or saturate the so-laid fibrous materials in adhesive compositions, whereby I complete my new combination; I make use of some machinery well known; and I likewise use combinations of machinery, consisting of parts and modifications of machines now first combined and connected together, which have not been, as I verily believe, so combined or connected heretofore. It may render the subject of my invention more clearly understood by observing that my new combination of fibrous materials is in contradistinction to the present mode of reducing fibrous materials into a state of pulp suspended in water, as in the manufacture of paper; also to the process of spinning and weaving, as in woven fabrics, and also to that of felting, as furs, wools, hairs, and other substances, are felted together. And in further compliance with the said proviso, I, the said Thomas Robinson Williams, do hereby describe the manner in which I perform my said invention by the following description thereof, reference being had to the drawings annexed, and to the letters and figures marked thereon, that is to say:

Process (A.)—Figure 1, A, B, represents a carding-engine, on the

feeding end of which I place the fibrous material, whether silk, cotton, flax, hemp, wool, fur, or hair alone, or mixtures of any of them, previously cleansed and opened by machinery in common use, as picker, devil, or willie. I sometimes use each material separately, as silk or cotton; at other times half of each; again, $\frac{1}{3}$ silk and $\frac{2}{3}$ cotton, guiding my operations in using or mixing those, or any of the other materials, according to the work proposed. When passed through the cards, it is deposited upon the doffer or last card C. The usual mode of taking off materials from the doffer of a carding-engine is by means of a comb and apparatus called a comb-crank, which delivers them in a thin sliver or tissue; but
493 the fibre in that case is too much in a longitudinal direction with the sliver to suit my purpose, therefore I make use of a fan, (D,) covered on the top, (1,) and moved with considerable velocity, which blows the material, (2,) finely opened from the doffer into the air, from which suspended state it is drawn, laid, and deposited, upon an endless revolving apron or band of woven metallic wire or cloth, or other perforated substance, or of wooden or metallic slats or rods (3, 4) extended round the two rollers, (5, 6;) and in order thus to lay the material equally upon the revolving apron, and to make a continuous bat, fleece, or sheet, I produce a partial exhaustion of the air in the box (E) which is open on the top, and fitted between the apron 3, 4. This partial exhaustion of the air may be produced at some distance from the machine, if required, provided it be connected with the box (E) by covered troughs or pipes, by any of the usual methods of exhausting; but it is here represented as I generally produce it by means of a fan, F, fixed under the floor upon which the carding-engine stands, and moved with any required velocity; (the sides next the axle being placed near two openings in the side-boxes, 7, 8, which are connected with E;) its revolution causing a sufficient exhaustion from its center, consequently in the box E, through the boxes 7, 8. The bat thus formed upon the endless apron moves onwards until it reaches and is received into an adhesive composition contained in a dipping-box or cistern G between the large roller H and the smaller ones *a, b, c, d;* thence it passes up between the two large rollers H, I, which may be adjusted to any required thickness of the bat by the lever and weights, (*h, i,*) and plummer blocks of the roller I. The best adhesive composition which I know consists of four or five parts of strong glue, carefully soaked in cold water, to one or two parts of flour of starch, made into a thin paste in cold water, mixed together, put into the cistern G, and gradually heated up to the boiling point by means of steam, which is introduced either through a pipe coiled round the inside of the cistern or a double bottom thereto. The heat may be obtained by direct fire, but steam is preferable in all respects. The adhesive composition may be varied, but after many experiments with glue, flour, starch, and also with gums that soften by heat and water, I have found the
494 above-mentioned composition best for general use. The bat of fibrous material now passed through and saturated in the cistern is continued by the web K over the drying machine in common use, of

which L, M, N, are three hollow metallic cylinders, heated through steam pipes, (9, 10, 11, 12,) and stuffing boxes (13, 14, 15.)

Process B.—Figure 2, A, B, also represents a carding engine; C, the doffer, and the material (2) flowing from it by the fan F; D, the exhausting fan; E, the exhausting box, which is here made to revolve upon its center, at the bottom, by means of a large circular rim, G, within which the air is drawn. On the top of this box are other lesser openings, upon which are placed any required forms, (example *b*, *c*, etc.,) set upon wheels, the centers of which are open for the air to pass through, but which are kept in their places by rims on their under sides, similar to that of the exhausting box E. They receive a slow revolving motion from an upright spindle (*d*) and pinion, (*e*,) placed exactly over the center of the box E. A sufficient quantity of the fibrous material having been deposited on one form, another made in two halves (3, 4) is placed over the material and inner form, and the whole removed together and dipped into the adhesive composition before described, which saturates it. The material thus combined is taken from the forms and dried. The forms may be made of any perforated substance of sufficient strength, but I prefer them of copper or zinc

Process (C.)—Figure 3, A, B, C, is the frame cylinder and usual arrangement of the common picker, having, however, a greater number of spiked teeth on the circumference of the cylinder, but without what are called opposition teeth. The fibrous material is placed upon the feed apron D, and when opened by the rapid revolution of the teeth on the cylinder it is deposited upon the endless revolving apron E, and thence passes on to the compressing rolls 1, 2, 3, 4, 5, 6, 7, the upper of which are weighted upon the lower; from these it passes into and through the cistern F, precisely as represented in process A. The adhesive composition used in this process is generally similar with that mentioned in process A, except that I sometimes add a little pitch or rosin, which may be easily melted with the composition, if it do not contain too much water.

495 Process D.—For some purposes, whether the artificial skin be required to be formed of a fine texture, or of considerable thickness and strength, and to be submitted to pressure, or to be stamped into various forms and irregular figures, my manner of proceeding is as follows, videlicit: Having formed the requisite bat, fleece, or sheet out of the fibrous material, by means of the machinery described under processes A or C, I place the same between frames of woven wire or perforated sheets of metal, wood, wicker-work, or cloth, for support, and to prevent its derangement; then I dip or saturate the same in the adhesive composition, and, when sufficiently dried or cooled, submit it to the necessary pressure, or to the stamping by dies into the forms required.

Process E.—For other purposes I find it convenient to spread evenly over one side of two sheets of the thinner article, formed by the means detailed in process A, the adhesive composition, which soon dries sufficiently to prevent its running; between these two sheets I place a bat formed out of the fibrous material, of any required thickness, by means of the machinery described under processes A or C, as may

be most suitable and convenient, (the prepared or glutinous sides of the sheets of the thinner material being next the upper and under sides of the said bat.) The whole thus laid is placed between heated dies or forms, and submitted to powerful pressure, thus at the same time softening the adhesive composition, and forcing it through the bat, which receives, and, when cold, retains the forms and shapes of the dies.

Process F.—In applying the artificial skins combined according to processes A and C, for the purposes of smoothing and polishing, as fish-skins are now used, I scatter upon the sheets, whether thick or thin, (immediately after they are dipped into the adhesive composition,) either emery, sand, or powdered glass, and which, when dry, become completely incorporated and united with the skin. I should here observe, in addition to the foregoing descriptions, that I consider the processes detailed under A and C as those most explanatory of my new manner of combining fibrous materials, forming, by means of the machinery therein described, the artificial skins; for example,
496 A the finer, and C, such as are required to be of a thicker and strong texture; and that the processes B, D, and E are generally more descriptive of the manner in which, whether formed of a fine texture or of considerable thickness and strength, they may be submitted to pressure, or stamped by means of dies, so that they shall receive and retain the figures, shapes, or forms thereby impressed into or upon them.

I do hereby declare this to be the specification of my new invention, and I claim to maintain exclusive right and privilege to the same.

In witness whereof, I, the said Thomas Robinson Williams, have hereunto set my hand and seal, this tenth day of August, in the year of our Lord one thousand eight hundred and thirty-three.

THOS. R. WILLIAMS. [L. S.]

And be it remembered that, on the tenth day of August, in the fourth year of the reign of his Majesty King William the Fourth, the said Thomas Robinson Williams came before our said lord the King, in his chancery, and acknowledged the instrument aforesaid, and all and everything therein contained and specified, in form above written. And also the instrument aforesaid was stamped according to the tenor of the statute made in the fifty-fifth year of the reign of his late Majesty King George the Third.

Enrolled the tenth day of August, one thousand eight hundred and thirty-three. HENLEY.

Disclaimer.

In the matter of a patent granted to Thomas Robinson Williams, esquire, late of Norfolk street, Strand, in the county of Middlesex, but now of No. 14 Lamb's Buildings, Bunhill Row, in the said county, for "a new combination of fibrous materals, forming, by means of machinery, artificial skins, which may be applied to the purposes for which skins, leather vellum, and parchment are now used,"
497 bearing date at Westminster, the fourteenth day of February,

one thousand eight hundred and thirty-three, to which said letters patent a specification was duly enrolled.

Disclaimer and memorandum of alteration proposed to be entered by Forbes McNeill, of Bunhill Row, in the county of Middlesex, felt manufacturer, assignee of the said patent, with the clerk of the patents of England, pursuant to an act passed in the fifth and sixth year of the reign of his late Majesty, intituled "An act to amend the law touching letters patent for inventions."

[The words printed in italics are in red ink in the original.]

I, the said Forbes McNeill, do declare that the said specification describes the invention to consist of a peculiar manufacture resulting from suspending fibrous materials in air, and drawing, depositing, or laying the same on to woven or perforated surfaces by a partial exhaustion of the air under or on the opposite side of such surfaces. And I have been advised and believe that the manufacture so produced is not wholly new, and I have also been advised and believe that the title in the said patent, and recited in the said specification, is too extensive, and that part of the title does not correctly express the object of the invention, for which reasons I am desirous to disclaim and alter, and do hereby disclaim and alter, parts of the said title by striking out the words "a new," and inserting the words "improvements in producing a" before the word "combination." And I also strike out the words "artificial skins which may be applied to the purposes for which skins, leather, vellum, and parchment are now used," and I insert the words "by suspending fibrous materials in air, and drawing, depositing, or laying the same on to woven or perforated surfaces by partial exhaustion of the air under or on the opposite side of such surfaces," after the words "fibrous materials." And I also insert the words "a bat, sheet, or fleece of fibres," after the word "machinery." And I have been advised and believe that the said specification is so drawn as to leave it in some doubt whether the machinery, or some parts of the machinery, are not claimed as
498 new, and whether the applying adhesive mixtures to sheets of fibres is not claimed as new; for which reasons I am desirous to alter, and do hereby alter the said specification by introducing some explanatory words and sentences, and by striking out others, in order to disclaim such machinery and parts of the machinery, and the processes described in the said specification, which constitute no part of the invention claimed in the said specification. And with a view to make the description of the means of carrying out the invention more full and correct, I have added other words in the specification. And in order that the nature and extent of this disclaimer and alteration may be fully understood, I have hereunto annexed a copy of the said specification, and which is to be taken as part hereof, in which I have ruled through those parts with red ink which I disclaim, and the alterations which I have made in the said title and the said specification I have written in red ink.

FORBES McNEILL.

To all to whom these presents shall come:

I, Thomas Robinson Williams, esquire, late of Norfolk street, Strand, in the county of Middlesex, but now of 14 Lamb's Buildings, Bunhill Row, in the said county, send greeting:

Whereas, his most excellent Majesty King William the fourth, by his letters patent under the great seal of the united kingdom of Great Britain and Ireland, bearing date at Westminster, the fourteenth day of February, one thousand eight hundred and thirty-three, in the third year of his reign, did, for himself, his heirs and successors, give and grant unto me, the said Thomas Robinson Williams, my executors, administrators, and assigns, his especial license, full power, sole privilege and authority, that I, the said Thomas Robinson Williams, my executors, administrators, and assigns, and such others as I, the said Thomas Robinson Williams, my executors, administrators and assigns, should at any time agree with, and no others, from time to time, and at all times during the term of years therein expressed, should, and lawfully might make, use, exercise, and vend, within England, Wales, and town of Berwick-upon-Tweed, and also in all his said Majesty's colonies and plantations abroad, my inven-
499 tion of [a new]* *improvements in producing a* combination of fibrous material *by suspending fibrous materials in air, and drawing, depositing, or laying the same on to woven or perforated surfaces, by a partial exhaustion of the air under or on the opposite side of such surfaces,* forming by means of machinery *a bat, sheet, or fleece of fibres,* [artificial skins, which may be applied to the purposes for which skins, leathers, vellum, and parchment are now used;]* in which said letters patent there is contained a proviso that I, the said Thomas Robinson Williams, shall cause a particular description of the nature of my said invention, and in what manner the same is to be performed by an instrument in writing under my hand and seal, to be enrolled in his said Majesty's high court of chancery, within six calendar months next and immediately after the date of the said in part recited letters patent, reference being thereunto had, may more fully and at large appear.

Now know ye that, in compliance with the said proviso, I, the said Thomas Robinson Williams, do hereby declare the nature of my said invention to consist *of improvements in producing a* [in a new]* combination of fibrous materials forming [artificial skins]* *a combined bat, fleece, or sheet of fibres,* by means of machinery; I suspend fibrous materials in air instead of water, and I draw, deposit, and lay the same on woven or perforated sheets or forms of metal, wood, or cloth, by means of a partial exhaustion of the air under or on the opposite side of the same. I dip or saturate the so laid fibrous materials in adhesive compositions, whereby I complete my new combination. I make use of some machinery well known, and I likewise use combinations of machinery, consisting of parts and modifications of machines, now first combined and connected together, which have not been, as I verily believe, so combined or connected heretofore. *I do not, how-*

* Erased in copy.

ever, make any claim to such new or old combinations of machinery, nor do I claim the means of applying adhesive matters as described to a sheet of fibres, as I am aware that similar means have been before resorted to when operating on sheets of fibres obtained by other means. It may render the subject of my invention more clearly understood
500 by observing that my new combinations of fibrous materials is in contradistinction to the present mode of reducing fibrous materials into a state of pulp suspended in water, as in the manufacture of paper. Also to the process of spinning and weaving, as in woven fabrics, and also to that of felting, as furs, wools, hairs, and other substances are felted together. And in further compliance with the said proviso, I, the said Thomas Robinson Williams, do hereby describe the manner in which I perform my said invention, by the following description thereof, reference being had to the drawings annexed, and to the letters and figures marked thereon, (that is to say:)

Process (A,) Figure 1.—A, B, represents a carding-engine, on the feeding end of which I place the fibrous materials, whether silk, cotton, flax, hemp, wool, fur, or hair alone, or mixtures of any of them, (previously cleansed and opened by machinery in common use, as picker, devil, or willie.) I sometimes use each material separately, as silk or cotton, at other times half of each, again one third silk and two thirds cotton, guiding my operations in using or mixing those, or any of the other materials, according to the work proposed; when passed through the cards it is deposited upon the doffer or last card C. The usual mode of taking off materials from the doffer of a carding-engine is by means of a comb and apparatus called a comb-crank, which delivers them in a thin sliver or tissue, but the fibre in that case is too much in a longitudinal direction with the sliver to suit my purpose, therefore I make use of a pan (D) covered on the top, (1,) and moved with a considerable velocity, which blows the material, (2,) finely opened from the doffer into the air, from which suspended state it is drawn, laid, and deposited upon an endless revolving apron or band of woven metallic wire or cloth, or other perforated substance, or of wooden or metallic slats or rods, (3, 4,) extending round the two rollers, (5, 6,) *which should be inclosed above and at the sides, though not so shown in the drawing;* and in order thus to lay the material equally upon the revolving apron, and to make a continuous bat, fleece, or sheet, I produce a partial exhaustion of the air in the box, (E,) which is open on the top and fitted between the apron 3, 4. This partial exhaustion of the air may be produced at some distance from the machine, if required, provided it be connected with
501 the box E by covered troughs or pipes, by any of the usual methods of exhausting, but it is here represented as I generally produce it, by means of a fan, (F,) fixed under the floor upon which the carding-engine stands, and moved with any required velocity, (the sides next the axle being placed near two openings in the side-boxes 7, 8, which are connected with (E,) its revolution causing a sufficient exhaustion from its centre consequently in the box E through

the boxes 7, 8. The bat thus formed upon the endless apron moves onwards until it reaches and is received into an adhesive composition contained in a dipping-box or cistern G, between the large roller H and the smaller ones *a*, *b*, *e*, *d*, thence it passes up between the two large rollers H, I, which may be adjusted to any required thickness of the bat by the levers and weights, (*h*, *i*,) and plummer-blocks of the roller I. The best adhesive composition which I know consists of four or five parts of strong glue carefully soaked in cold water, to one or two parts of flour or starch made into a thin paste, in cold water, mixed together, put into the cistern G, and gradually heated up to the boiling point by means of steam, which is introduced either through a pipe coiled round the inside of the cistern or a double bottom thereto; the heat may be obtained by direct fire, but steam is preferable in all respects. The adhesive composition may be varied, but after many experiments with glue, flour, starch, and also with gums that soften by heat and water, I have found the above-mentioned composition best for general use where the *matter produced has been for more expensive articles of manufacture, but I use pitch and tar for cheaper articles.* The bat of fibrous material now passed through and saturated in the cistern is continued by the web K over the drying machine in common use, [of which]* *which is not claimed under the present letters patent.* L, M, N, are three hollow metallic cylinders heated through steam-pipes (9, 10, 11, 12,) and stuffing boxes (13, 14, 15.)

Process B, Figure 2.—A, B, also represents a carding-engine. C, the doffer and the material (2) flowing from it by the fan F. D, the exhausting fan. E, the exhausting box, which is here made to revolve upon its centre at the bottom by means of a large circular
502 rim, G, within which the air is drawn. On the top of this box are other lesser openings, upon which are placed any required forms, (example *b*, *c*, etc.,) set upon wheels, the centers of which are open for the air to pass through, but which are kept in their places by rims on their under sides, similar to that of the exhausting box E; they receive a slow revolving motion from an upright spindle (*d*) and pinion (*e*,) placed exactly over the box E. A sufficient quantity of the fibrous material having been deposited on one form, another made in two halves, (3, 4,) is placed over the material and inner form, and the whole removed together and dipped into the adhesive composition before described, which saturates it; the material thus combined is taken from the forms and dried. The forms may be made of any perforated substance of sufficient strength, but I prefer them of copper or zinc.

[Process C, Figure 3.—A, B, C, is the frame cylinder, and usual arrangement of the common picker, having, however, a great number of spiked teeth on the circumference of the cylinder, but without what are called opposition teeth. The fibrous material is placed upon the feed-apron D, and when opened by the rapid revolution of the teeth on the cylinder, it is deposited upon the endless revolving apron E, and thence passes on to the compressing rolls, 1, 2, 3, 4, 5, 6, 7, the

*Erased in copy.

upper of which are weighed upon the lower; from these it passes into and through the cistern F, precisely as represented in process A. The adhesive composition used in this process is generally similar with that mentioned in process A, except that I sometimes add a little pitch or rosin, which may be easily melted with the composition, if it do not contain too much water.*]

Process D.—For some purposes, whether the artificial skin be required to be formed of a fine texture or of considerable thickness and strength, and to be submitted to pressure, or to be stamped into various forms and irregular figures, my manner of proceeding is as follows, videlicet: Having formed the required bat, fleece, or sheet out of the fibrous material by means of the machinery described, [under processes A or C]* I place the same between frames of woven wire or perforated sheets of metal, wood, wicker-work, or cloth for support, and to prevent its derangement, then I dip or saturate
503 the same in the adhesive composition, and when sufficiently dried or cooled, submit it to the necessary pressure, or to the stamping by dies into the forms required.

Process (E.)—For other purposes I find it convenient to spread evenly over one side of two sheets of the thinner article formed by the means detailed in Process A the adhesive composition, which soon dries sufficiently to prevent its running. Between these two sheets I place a bat formed out of the fibrous material of any required thickness, by means of the machinery described [under Processes A or C,]* as may be most suitable and convenient, (the prepared or glutinous sides of the sheets of the thinner material being next the upper and under sides of the said bat;) the whole thus laid is placed between heated dies or forms, and submitted to powerful pressure, thus at the same time softening the adhesive composition and forcing it through the bat which receives, and when cold retains, the forms and shapes of the dies.

Process (F.)—In applying the [artificial skins]* *sheets of fabric*, combined according to Process[es] A [and C],* for the purpose of smoothing and polishing, as fish-skins are now used, I scatter upon the sheets, whether thick or thin, (immediately after they are dipped into the adhesive composition,) either emery, sand, or powdered glass, and which, when dry, become completely incorporated and united with the [skin]* *fabric*.

I should here observe, in addition to the foregoing descriptions, that I consider the process[es detailed under]* A [and C,]* as [those most]* *that which is* explanatory of my new manner of combining fibrous materials [forming by means of the machinery therein described, the artificial skins; for example, A, the finer, and C such as are required to be of a thicker and stronger texture]*. And that the Processes B, D, and E, are generally more descriptive of the manner in which, whether formed of a fine texture or of considerable thickness and strength, they may be submitted to pressure, or stamped by means of dies, so that they shall receive and retain the figures, shapes, or forms thereby impressed into or upon them.

*Erased in copy.

I do hereby declare this to be the specification of my new
504 invention, and I claim to maintain exclusive right and privilege to the same.

In witness whereof, I, the said Thomas Robinson Williams, have hereunto set my hand and seal, this tenth day of August, in the year of our Lord one thousand eight hundred and thirty-three.

(Signed) THOMAS R. WILLIAMS. [L. S.]

Taken and acknowledged by Thomas Robinson Williams, party hereto, this tenth day of August, one thousand eight hundred and thirty-three, before me,

HENLEY,
Master in Chancery.

To the Clerk of the Patents of England:

This to certify that the above-named Forbes McNeill, of Bunhill Row, in the county of Middlesex, manufacturer, assignee of a patent granted to Thomas Robinson Williams, under the great seal of Great Britain, dated at Westminister, the 14th day of February, one thousand eight hundred and thirty-three, and to which a specification was duly enrolled, has applied to me for leave to enter with you the above-written disclaimer and memorandum of alteration of the said patent; and in considering the said application I directed him to advertise his said disclaimer and memorandum of alteration in the London Gazette, and in the Times and Morning Chronicle newspapers, and such advertisements have been duly made, and no objection having been made to the said application, I have accordingly granted leave to the said Forbes McNeill to file his said disclaimer and memorandum of alteration pursuant to the statute passed in the fifth and six years of his late Majesty King William the Fourth, intituled "An act to amend the law touching letters patent for inventions."

FRED. POLLOCK.

Temple, April 18, 1843.

FORBES McNEILL. [L. S.]

505 And be it remembered, that on the twenty-fourth day of April, in the sixth year of the reign of her Majesty Queen Victoria, the said Forbes McNeill came before our said lady the Queen, in her chancery, and acknowledged the instrument aforesaid, and all and everything therein contained and specified, in form above written. And also the instrument aforesaid was stamped according to the tenor of the statute made in the fifty-fifth year of the reign of his late Majesty King George the Third.

Enrolled the twenty-seventh day of April, one thousand eight hundred and forty-three.

RUSSELL.

507 A. D. 1837. No. 7397.

Manufacture of hats.—Wells' specification.

To all to whom these presents shall come:

I, Henry Augustus Wells, of New York, formerly residing at the North and South American coffee house, in the city of London, and now at 29 Henrietta street, Brunswick square, in the county of Middlesex, hat manufacturer, send greeting.

Whereas, her present most excellent Majesty Queen Victoria the first, by her letters patent, under the great seal of Great Britain, bearing date at Westminister, the thirtieth day of June, in the first year of her reign, did, for herself, her heirs and successors, give and grant unto me, the said Henry Augustus Wells, her especial license that I, the said Henry Augustus Wells, my executors, administrators, or such others as I, the said Henry Augustus Wells, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time, and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend, within England, Wales, and the town of Berwick-upon-Tweed, my invention of "certain improvements in the manufacture of hats;" in which said letters patent is contained a proviso, obliging me, the said Henry Augustus Wells, by an instrument in writing, under my hand and seal, particularly to describe and ascertain the nature of my said invention, and in what manner the same is to be performed, and to cause the same to be enrolled in her said Majesty's high court of chancery within six calender months next and immediately after the date of the said recited letters patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Now know ye that, in compliance with the said proviso, I, the said Henry Augustus Wells, do hereby declare that the nature of my said invention consists, as hereinafter more particularly described, in certain improvements in various of the processes of the hat manufacture from the first process of clearing the fur and other substances, and in making the hat-bodies, and used for napping, to that process
508 of the hat manufacturer, which consists in covering the hat-body with a nap previous to its being dyed, or sent to the hatter to be shaped and made up for wear; and such improvements, stated more in detail, consist in new or improved methods: first, of clearing fur used in the making of hat bodies, and for napping; second, of converting the same fur, when to be used for the formation of the substance or texture for hat-bodies, into a fine web or fleece; third, of applying steam in the formation of the latter into hat-bodies; fourth, of hardening or basoning; fifth, of felting or planking; sixth, of stiffening or proofing; seventh, of covering hat-bodies (commonly called ruffing or napping,) and clearing the nap, all by means presently to be described; and also further consists in the production of an improved substance or texture for hat-bodies, by means of the use or application of a much larger proportion of non-felting materials than have been used in making hat-bodies heretofore, and whereby a

pile or nap is so produced from such non-felting materials conjointly with the felting-furs or wools, as to render unnecessary the application to or sticking on of a nap to the hat-bodies made of such improved substance or texture.

And in further compliance with the said proviso, I, the said Henry Augustus Wells, do hereby describe the manner in which my said invention of the said several improvements is to be performed, reference being had to the drawings annexed, and to the figures and letters marked thereon.

Figure 1, plate 1, is a longitudinal section of a blowing machine used for the purpose of clearing the fur to be used in making the hat-bodies, or to be used for napping. This machine consists of a cased frame, divided into three or more compartments, separated by the divisions I, I, each containing a cylindrical blower or picker marked D, studded with small spikes or wires, about five-eighths of an inch in length each, and placed about half an inch apart from each other, revolving on an axle, at the extremity of which is fixed a small pulley (P) for the purpose of receiving motion from the moving or driving-pulley L. A and B are two rollers (in each division,) which must be made of the same length as the cylindrical blower or picker, and those I have generally made about thirty inches in length. These rollers carry an endless feed-apron made of cloth, leather, or other suitable substance, and receiving motion from the belt
509 connecting a small pulley on the driving-shaft of L with a larger pulley on the axle of A at the contrary side of the machine to that presented to view in figure 1. C, C, are two feeding or delivering rollers of the same length as the rollers A B; and M is a wire grating or sieve (in each division) suspended at the point N on an axle, and having a slight reciprocating motion imparted to it by two pins or cams protruding from the shaft S, which latter is connected by a belt with the rollers B. E, E, E, are chambers covered with fine wire, woven sufficiently close to allow the air to escape without the fur. The machine being set in motion, and the workman having commenced spreading the fur upon the endless web connecting A and B at the feeding end of the machine, under L, the fur will be obviously carried forward and drawn into the first compartment by the feeding-rollers C, C, and the finer particles of the fur are driven or wafted by the quick revolutions of the cylindrical picker D into the upper space E, the remaining particles in the meanwhile falling upon the wire grate M; such part of them as consists of hair will be caused to pass or fall through into the space or box H, and such of them as consist of dags and dirt will be shaken off by the motion given, as above described, to the wire grating or sieve M into the space G. The fur which is carried, wafted, or driven on to the feed-apron of the succeeding compartments will, in like manner, be drawn through the second compartment, and so in like manner through the third compartment or any further number of compartments, and be ultimately brought out by the last pair of delivering-rollers C, C, at the further end of the machine. The fur, when the same is intended to be used in making hat-bodies, is then to be taken and placed upon another machine for the purpose of being formed into a fine web or

fleece, to be afterwards felted into hat-bodies. When the fur is intended to be used for napping, it should be gathered and set apart ready to be applied for napping; and so also the furs cleared by the said machine suitable for hat-bodies may be gathered and made into hat-bodies by any of the methods or processes now in use. I, however, take the said last-mentioned fur and make the same into a web or fleece by means of the machine next mentioned. The dags
510 falling into the boxes G may be again passed through the machine, for the purpose of procuring any remaining portion of fur which may have fallen with them.

Figure 1, plate 2, is a longitudinal section of the machine for forming the fur into a fine web or fleece. This machine consists of a common carding-engine having one main cylinder, B; a feed-apron, A; feed-rollers, licker-in, workers, strippers, fancy cylinder, and doffer, as represented around it, all of which are so well known as to need no description, as it is in no way altered by me, excepting that the cylinders are smaller than usual, and that I place a circular covering over the fancy so as to throw the fur raised by it upon the doffer cylinder; and I have also attached a second fancy cylinder marked C, driven by the pulley T, by which all the fur thrown upon the doffer by the first fancy, and all that which may be taken by the doffer from the main cylinder is thrown by the last fancy into the air in the next department of the machine, where it is formed into a web by the following machinery: G, G 1, G 2, are three rollers receiving their motion from the pulley D, which latter takes its motion from a pulley, Y, on the same shaft which moves the feed-apron of the cord by the belt marked *a;* around these rollers there is an apron or endless fine woven wire, N, through which air can pass, but not the fur; *b*, *b*, are two apertures through the side of the machine, for the purpose of admitting air; E is a fan formed on a shaft resting on and turning in bearings between the apertures *v*, *v*, and supported on the other end by an upright outside the frame. This fan is formed of a flat circular board, about four feet in diameter, to which (next the frame) are affixed four fans marked *h*, *h*, *h*, *h*, made of sheet iron or some other thin metallic substance, about one foot wide, revolving as near to the side of the machine as possible without danger of coming in contact; V is a projecting board, covering about two-thirds of the space between the fancy C and the first roller G; *e*, *e*, are two rollers bearing and revolving by contact upon the rollers G 1, G 2, and having a lateral motion given to them by two levers R, R; these two levers rest or move upon centers *f*, *f*, near the middle; the upper ends slide in an eccentric groove, varying one-half inch from a true circular line fixed on the same shaft as the pulley O, which latter receives
511 motion from the driving-pulley L. H is a small pulley worked from G, and having a crank or pin I fixed to the side thereof; to this crank is attached a connecting rod, *l*, communicating at the other end with a board J. The machinery being set in motion by the driving-pulleys K, L, M, N, the fur, on coming from the card-fancy C, after having passed through the carding-machine, will be drawn forward by the fan E, and be conducted upon the endless wire web N covering G, G 1, G 2, from which it will be conducted after being

somewhat hardened by the pressure and lateral motion of *e*, *e*, in the direction of *g* upon the board J, there laid in successive folds by the motion which the board receives from the crank I, and in this state, when in sufficient quantity, it may be removed either to the next machine in order to its further use in forming the hat-body, or otherwise applied in forming the hat-body, by any of the processes now in use. The foregoing machine and carding-engine are surrounded by a wooden case marked P P P.

Figure 1, plate 3, is a front elevation of another machine, to which the web of fur is next to be conducted for the purpose of being formed into a hat-body. A, A, represent the several upright pieces of the frame-work; L, L, are two pieces of horizontal frame-work, connected by girths or stretchers, and properly supported, and have on their top surfaces a rib of iron extending the whole length, to form a railway for the carriage resting upon the weels K, K; N, N, are two uprights connected by two girths resting on the axles of the wheels K, K. N, N, are connected by the board W; the said uprights N, N, at their tops, support the bearings of the two rollers R, R. On the under side of the bottom of the carriage is placed a piece of board, two inches wide and one and a half inch thick, fixed transversely. In this piece of wood is fixed a pin, connected to a crank by the rod of shaft *s*, which crank works under the carriage and produces a transverse or alternating motion of the carriage; the crank-shaft receives its motion by the bevel-wheel T, geared into bevel U, fixed on the shaft V, which is supported by frame work, and receiving motion from the driving-pulley B, by the pinion D working into a spur-wheel C; P, and P 1, are two pulleys fixed upon the ends of the rollers R, R, and connected together by a belt; O is another pulley, fixed on the axle of the lower roller R, receiving motion from the pulley J, by means
512 of a belt. In the shaft I is a groove to admit of the pulley J sliding upon the same as the carriage traverses; and in this pulley is a corresponding key, so that both shall revolve together without the latter being confined endwise. On the shaft I is fixed a pulley, H, receiving motion by a belt from the pulley G, which is set in motion on being properly connected with the driving-pulley B. S is a shaft supporting and passing through a double cone, X, X, made of tin or other light substance, covered with cloth, and on which the hat-bodies are to be formed. In the center of the said cones is a small groove, *g*, for the convenience of dividing the hat-bodies when formed and ready to be removed; on the shaft S is fixed a pulley, F, receiving motion from the pulley E by a belt. A small box is placed nearly under the center of the cones, to receive any fur that may fall from the cones, and directly underneath the cones are small pipes, having minute apertures, for the purpose of admitting steam to the web in its progress towards the cones, and also when on the cones, for the purpose of giving the hat-body a more adhesive or felting quality. The machinery being set in motion by means of a pulley, B, the web of fur is to be brought from the machine, figure 1, plate 2, last described, and laid upon a board placed near to the cones; one end of the web is to be then gently raised from the board and passed over the carrying-rollers R, R, and thence be conducted

to the cones X, X; and while the carriage traverses from side to side, the web covers the cones from point to point, and it should be wound from three to five times round the cones, according to the substance of the bodies required. The hat-bodies from these cones, or otherwise constructed upon other cones, may then be hardened in the manner next hereinafter described. When the cones are covered they may be removed and replaced with other like cones, ready to receive the web or fleece for the hat-body. Figure 1, plate 1, is a drawing of a machine for hardening or basoning. The cones X, X, taken from the machine, figure 1, plate 3, when the hat-bodies have been formed upon them, or other like perforated cones with hat-bodies upon them, or formed upon them, are then used in the said hardening or basoning machine, in the manner hereinafter described, for the purpose of hardening the hat-bodies thereon.

513 The cones X, X, or such other cones as last mentioned, I call hereafter, for the sake of distinction, "the hat body cones." Two other perforated metallic cones, of rather larger size, which, for the sake of distinction, I call "cap-cones," are then placed upon or over the bodies contained upon the hat-body cones, so as to confine the bodies completely between them. The hat-bodies, where they join at their bases, are then cut around to separate them; they are then ready for the next process, that of hardening or partially felting, (commonly called basoning;) the bodies so inclosed between metallic cones, are then taken to the machine, (figure 1,) plate 4, where one pair of the hardening-cones only are shown; but it is evident any number of the like construction may be combined and operated by the same moving parts as are here shown. A and B, figure 1, plate 4, are two hardening-cones, made either of wood or metal, A having coarser perforations than either pair or set of the above cones, which coarser perforations are made for the admission of steam to the body. One pair or set of cones is now placed on the cone A by depressing the handle 1 from the pin 2 to the pin marked 3; the other end of the lever 4, in which it will be seen the axis of the cone B rests, will cause the cone B to be lifted from the cone A, so as to place upon the cone A one of the hat-bodies included, as before stated, between two perforated cones; this being done, and by lifting the handle 1 the cone B is again let down, so as to rest upon the outer cone; steam is then let up into the cone A by turning the cock 5, (the axis of A being a hollow steam-pipe 6, with a stuffing-box at 7;) the two cones, A and B, now receive an alternating rotatory motion, in the following manner: Moving two or three times in one direction, and then being reversed, and moving the same number of times in the opposite way. C is the driving-pulley or prime-mover, upon the axis of which is the crank D, connected with the shackle-bar E, secured by the stud F to the wheel G; as the crank D revolves, it will be seen that the wheel G will alternate through about one-fourth of its circumference. This alternating motion will be communicated by the band 8 to the pulley H, upon the axis of which is a beveled wheel, 9, acting upon another beveled wheel, 10, upon the axis of the cone B; the cone B, resting

514 with its weight upon the outer cone, immediately under which is the hat-body resting upon the hat-body cone, placed upon

the cone A will, by its weight and contact, cause the said several cones and body to revolve, as before described, two or three times in each direction, which, if continued for a very few minutes, causes the body between the said perforated cones to be hardened or basoned, ready for the next process to be performed by the machine.

Figures 1, 2, and 3, plate 5, called the planking-machine; plate 5 contains a plan, and two sections of a machine, to be next used for planking, reducing, or felting hat-bodies. A A is a frame or stand, on which is placed a trough containing water, slightly impregnated with sulphuric acid, and kept boiling by a coiled steam-pipe, marked C, lying at the bottom; D, D, are rollers formed of a composition of zinc and lead or other suitable metallic substance, each pair being geared at their ends by pinions E, and the upper roller of each pair geared into the horizontal worm or screw, marked F, by the spur-wheels G, G; O is a guide; H is a larger roller geared into the end rollers D, for the purpose of turning the hat-bodies over, and giving them direction backwards on the top of the machine after they have been passed successively through each pair of rollers; L, L, are levers, having the weights M, M, bearing upon them, suspended to each upper roller, for the purpose of giving a slight pressure to the hat-bodies, as the substance of each may require; I is an inclined board, for the purpose of giving the hat-bodies, when laid thereon by the workman, a direction towards the rollers; K, K, is a fast and loose driving-pulley on the worm-shaft F. The machinery being set in motion, and the hat-bodies placed one after another upon the inclined board I, the hat-bodies will be drawn forward, and by keeping the bottom rollers and a portion of the top rollers immersed in the boiling acid mixture, as shown by the dotted line, they will be continually exposed to the action of the same till they come out at the farther end, and return on the top of the rollers to the operator to be crossed, a term well known to hat manufacturers, and again passed through the machine as often as may be necessary, to render them fit for proofiing.

About fifty pair of rollers may be used to advantage. The
515 number of rollers may be varied in the different machines, according to the substance of the bodies and the quantum of work or felting required.

Figures 1, 2, and 3, plate 6, are elevation, plan, and section of a machine for stiffening or proofing. A is a vessel having two compartments, separated by the division B, and containing a solution of shellac or other substance, commonly used for stiffening or proofing hat-bodies; the solution in one compartment being somewhat stronger than the solution in the other, according to the strength of the stiffening required; C, C, are two rollers, turning on bearings fixed in the standards D, D, geared together at their extremities E, E, and turned by the fixed driving-pulley F; G, being a loose pulley; H is a joint to allow the standard D to fall back when required; I is a weight suspended to the line K K, running over the pulley L, and fixed at its other end to the standard D, for the purpose of causing the rollers to press against each other with sufficient force, that when the rollers are set in motion, and the body of the hat, (being previously soaked in the solution contained in the box A, and placed

in the proper position to be taken by the rollers upwards,) is allowed to be drawn through or between the said rollers, the pressure shall squeeze out all the superfluous stiffening solution, which will fall down upon the board M, and thence be conducted back into the same compartment in which the hat-body had been soaked, care being taken to cause the board M, which works on two pivots, to slope towards the same compartment in which the hat-body had been immersed. The more stiffening there may be required in the body, the less should be the weight used to compress the rollers.

Figure 1 is a side elevation; figure 2 a plan, and figure 3 a transverse section on plate 7 of machinery, for the purpose of covering hat-bodies, (commonly called ruffing or napping,) and clearing the nap. A, Figures 1, 2, and 3, is a water-tight box, (the upper part of which is made to open;) B, (figure 2,) the axle of two driving pulleys, marked C; D is a strap or band which communicates motion from the driving-pulley C, to the small pulleys E, E, E, fixed upon the hollow axis F of the cones G, through which the steam is admitted into the said cones, from the supply steam-pipes H, H.

516 Figures 1 and 3 are conical riders or rollers revolving by contact upon the hollow cones; *k*, *k*, is a pipe for conveying hot water from the funnel L, from which pipe descend the pipes *e*, *e*, perpendicularly over the tips of the cones, as represented at figure 3, which pipes are perforated at the bottom, allowing hot water to drop or run upon the tips of the hat-bodies upon the cones. On each of the said cones G, is placed a hair-cloth in the shape of a hat-body or cap, somewhat larger than the cone, so as to hang from its lower side, and in this hair-cloth cap is placed a hat-body, having the fur previously laid upon it and wetted, and being somewhat longer than the hair-cloth. Over the hat-body, and somewhat larger than it, is placed another hair-cloth. Hot water should be poured into the funnel, which will drop or run through the small perforations in the tubes *e*, *e*, upon the hat-body; a slow motion is then given to the cones, by applying steam or other power to the driving-pulleys, and which slow motion is continued until the nap has stuck, when the said cones should be made to revolve quicker, and steam admitted into the interior through the pipes H. The hat-body, then scalded, should be allowed to remain upon the cone, revolving and exposed to the steam and the hot water about twenty minutes, by which time the nap will be sufficiently scalded in, if the operation be conducted with care and attention. The hat-body should be taken off, turned, and put in again two or three times during the operation. Several hat-bodies may be placed upon each cone, and may be operated upon at the same time, the steam and hot water being admitted in sufficient quantities, according to the judgment of the operator. The steam is also again applied to the interior of the cone, which must now be made to revolve with greater speed, the effect of the centrifugal force will then be to throw off the water from the hat-body, being also assisted by the steam, when the nap will be cleared, or in effect raised up in readiness for blocking; or for more effectually accomplishing this, a conical or cylindrical brush, roller, or rider, may be made to revolve upon the cone, by contact or otherwise, with or

without a reciprocating lateral motion. It will be obvious that although my improvements extend over and are applicable to all the several processes of the hat manufacture hereinbefore mentioned, from the process in clearing the fur to that of napping the
517 finished hat-body, and may be all used in one and the same hat manufactory; yet some of these improvements may be used separately, in conjunction with or for the purposes of some of the existing processes or methods of manufacturing hats; and I claim the same improvements separately, in manner herein stated, and do claim an exclusive right and privilege in the same, and in each of them, during the term of the said letters patent. Now whereas, having of necessity described many parts of the above-mentioned machines which are old, though, perhaps, some of them appear in somewhat a new form to accommodate my improvements, I hereby declare that I only claim as those which constitute my improvements in the manufacture of hats:

First. The aforesaid method of clearing fur used in the making of hats, or for napping hats by means of a machine, which I call a blower, containing three or more pickers, substantially as hereinbefore described.

Second. The aforesaid method of producing a web or fleece of fur upon a wire apron, and hardening the same by means of rollers, substantially as hereinbefore described.

Third. The aforesaid method of forming the aforesaid web into hat-bodies on perforated cones when covered with cloth, and the application of steam to such web or the hat-body while being formed of or from the same, substantially as hereinbefore described.

Fourth. The aforesaid method of hardening or basoning of hat-bodies, substantially as hereinbefore described.

Fifth. Of felting or planking by means of the application of a series of rollers, substantially as hereinbefore described.

Sixth. Of stiffening or proofing, substantially as hereinbefore described.

Seventh. Of covering hat-bodies (commonly called ruffing or napping) and clearing the nap, substantially as hereinbefore described.

And here it may be necessary to state that I do not claim the machine for forming hat-bodies hereinbefore described, but only the use of perforated cones covered with cloth, to receive the web or fleece of fur, and the application of steam to the said web or fleece when the same is being formed into the hat-body; and in respect to the
518 said other machines, and the claims hereinbefore lastly stated, it is proper that I should add that I do not claim the several individual parts of which the aforesaid machines are composed as new, but such a combination and arrangement of them, substantially as before described, and claimed as being new, for producing the effects hereinbefore mentioned. And whereas it is well known that a very small portion of silk and other non-felting materials have been used in the substance of hat-bodies, and the use of such non-felting materials therein hath chiefly been confined to preventing the too quick felting of furs or wools used in making the hat-bodies, upon or over the surface of which it is the usual and common practice to

put a covering or nap of fur, or woven plush, or down of silk, cotton, and other materials constituting the nap of the hat, and such non-felting materials have not been used or applied in the manufacture of hat-bodies, for the purpose of procuring from the body itself (without affixing a nap as is usually done) a full, thick, and durable nap.

Now I do claim, as a further improvement in the manufacture of hats, the production of such improved substance or texture for hat-bodies as hereinafter is described, furnishing from itself a full and durable nap, as hereinafter mentioned, and rendering unnecessary the sticking on of a nap, which is the common and universal practice. The mode I have found best in practice for performing my said last-mentioned improvement I describe as follows: I take any description of fur or wool of a high felting quality, but I prefer caroted hares' fur, which is well known to hat manufacturers, and I clear the same from kemps, dirt, and dags, and this I prefer doing by means of my first-mentioned blowing machine, hereinbefore described, through which I pass once the fur to be used; I then take at least one-third, by weight, of non-felting materials, such as silk or cotton, but I prefer with the caroted hares' fur the use of the waste raw silk when heckeled or prepared, an article well known in commerce. I cut this raw silk into lengths, from three-quarters to one inch in length, which afterwards provides a suitable nap, as hereinafter described; but the nap will be shorter or longer according as the silk may be cut into long or short lengths. More than one-third of the non-felting materials may be used without in-
519 jurious results to the felting of the hat, and where less than one-third may be used a nap may be procured from the hat-body, although not so full and thick as when one-third of the non-felting materials shall be used; but, as before stated, I use a third, by weight, of non-felting materials, and I find that proportion the best adapted for felting the fur, and afterwards producing a full, thick, and durable nap. When the silk has been so cut it is mixed thoroughly with the fur so cleared, as before mentioned, which fur, by weight, should be double in quantity to the non-felting materials. I accomplish this mixing by passing the fur and non-felting materials through my said blowing machine, and I gather the materials which have passed through the said machine, and form them into a web, and subsequently into hat-bodies by means of the second, third, fourth, and fifth machines hereinbefore mentioned. After the hat-body has been hardened or basoned, and planked, or felted, and before it is stiffened, it should be examined, and when dry, cleared by means of a shaving knife of all kemps that may be visible, after which it is dipped into boiling hot water, and by means of a fine small hand-card, similar to those used by hatters, the nap is drawn out or carded up. During this process the hat-body should be as frequently dipped into the hot water as may be found necessary. After the nap has been sufficiently brought out, which can be easily judged of by the workman, the hat-body when again dried is stiffened and water-proofed. The process of stiffening and waterproofing I perform by means of my machine hereinbefore described. Although I have described the mode of mixing the silk and fur, and forming the same

into a hat-body, chiefly having reference to the use of my said several machines, yet such silk and fur may be mixed together by other means well known to hat manufacturers, and a substance or texture for hat-bodies may be formed thereof, by means of the methods usually practiced at present for making hat-bodies, and a nap be brought out therefrom by similar means to those hereinbefore described. A hat-body of cheaper materials, and well suited for commerce, can be made of cony wool and fine cotton mixed in the like proportions of two-thirds of wool to one-third of cotton, by pursuing with the same a process similar to that which I have lastly hereinbefore described, where caroted hares' fur and waste raw silk cut into short lengths are used. Other suitable furs and suitable non-felting materials may, when prepared and mixed in like proportions, be similarly formed into hat-bodies, out of which a full and durable nap can by carding be obtained.

Now, having described the mode of performing my last-mentioned improvement, I do not claim any novelty either in the materials used, except as to the proportions, or in the processes by which hat-bodies are usually, or by means of machinery, made by hat manufacturers; but I do claim as a further part of my said invention, agreeably to the above description, the production of an improved substance or texture for hat-bodies, by means of the use or application of a much larger proportion of non-felting materials than has hitherto been used, namely, a proportion equal to one-third, by weight, of the whole materials used, and from which substance or texture, or from such larger portion of non-felting materials therein conjointly with the felting materials, I produce or procure a full and durable pile or nap, and by which means the necessity of putting on or affixing a nap, will be obviated in all cases of hats made out of the said improved substance or texture. It will be obvious that although all the several improvements before mentioned are described to take place in those processes of manufacture of hats, which are usually performed previously to the hat-bodies being dyed or made up and shaped for wear, yet the hatter, according as he thinks fit, will be enabled to form the same hat-bodies into various shapes, sizes, and colors of hats, either with or without brims or bonnets, or caps, for the use of the public. And such my invention of the said several improvements, as hereinbefore described and claimed, to the best of my knowledge and belief being entirely new, and never before used within that part of her said Majesty's United Kingdom of Great Britain and Ireland, called England, her said dominion of Wales or town of Berwick-upon-Tweed, I do hereby declare this to be my specification of the same, and I do verily believe this my said specification doth comply in all respects fully and without reserve and disguise, with the proviso in the said hereinbefore in part recited letters patent contained, wherefore I do hereby claim to possess and maintain exclusive right and privilege to my said invention.

In witness whereof, I, the said Henry Augustus Wells, have hereunto set my hand and seal, this thirtieth day of December, one thousand eight hundred and thirty-seven.

HENRY A. WELLS. [L. S.]

And be it remembered that on the thirtieth day of December, in the first year of the reign of her Majesty Queen Victoria, the said Henry Augustus Wells came before our said lady the Queen in her chancery, and acknowledged the instrument aforesaid, and all and everything therein contained and specified, in form above written; and also the instrument aforesaid was stamped according to the tenor of the statute made in the fifty-fifth year of the reign of his late Majesty King George the III.

Enrolled the thirtieth day of December, one thousand eight hundred and thirty-seven.

MARTIN.

523 A. D. 1838. No. 7608.

Manufacture of hosiery, shawls, carpets, rugs, etc.—Robertson's specification.

To all to whom these presents shall come: I, William Angus Robertson, of Peterborugh Court, Fleet street, in the city of London, gentleman, send greeting.

Whereas her Most Gracious Majesty Queen Victoria the First, by her letters patent under the great seal of Great Britain, bearing date at Westminster, the fourth day of April, one thousand eight hundred and thirty-eight, and in the first year of her reign, did, for herself, her heirs, and successors, give and grant unto me, the said William Angus Robertson, her especial license, that I, the said William Angus Robertson, my executors, administrators, and assigns, or such others as I, the said William Angus Robertson, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time, and at all times during the term of years therein expressed, should and lawfully might make, use, exercise, and vend within England, Wales, and the town of Berwick-upon-Tweed, an invention, communicated to me by a foreigner residing abroad, of "certain improvements in the manufacture of hosiery, shawls, carpets, rugs, blankets, and other fabrics," in which said letters patent there is contained a proviso obliging me, the said William Angus Robertson, by an instrument in writing under my hand and seal, particularly to describe and ascertain the nature of the said invention, and in what manner the same is to be performed, and to cause the same to be enrolled in her Majesty's high court of chancery within six calendar months next and immediately after the date of the said recited letters patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Now, know ye, that in compliance with the said proviso, I, the said William Angus Robertson, do hereby declare that the nature of the said invention, and the manner in which the same is to be performed, are described and ascertained as follows, (that is to say:)

One of the improvements consists in employing in the man-
524 ufacture of hosiery, shawls, blankets, rugs, and carpets, and in the manufacture of long continuous tissues or fabrics called or known as cloths, stuffs, velvets, and plushes, or by whatever other

name known, a thread or yarn composed wholly of the fur of the hare, rabbit, beaver, muskrat, nutria, otter, or raccoon, or composed partly of such fur and partly of wool, or partly of such fur and partly of silk, or partly of such fur and partly of cotton; and the manner of performing the said improvement is as follows: If it be intended to use a thread of fur alone, the fur to be used should be freed from the kemps or hair by any of the present fur blowing-machines, but I consider that it will be best effected by passing the same through a blowing-machine known partially to hat manufacturers, and which is constructed according to the following description, that is to say:

Figure 1 of the drawings No. 1 is a longitudinal section of the blowing-machine last referred to. It consists of a cased frame, divided into three or more compartments, separated by the divisions I, I, each containing a cylindrical blower or picker marked D, which is from fifty to seventy inches in length, and studded with small spikes or wires about five-eighths of an inch in length each, and placed about half an inch apart from each other. The entire frame revolves on an axle, at the extremity of which is fixed a small pulley, P, for the purpose of receiving motion from the moving or driving pulley L. A and B are two rollers (a pair being required for each division) which must be made of the same length as the cylindrical blower or picker. These rollers carry an endless feed-apron, made of cloth, leather, or other suitable substance, which receives motion from the belt connecting a small pulley on the driving-shaft of L with a larger pulley on the axle of A, at the contrary side to that presented to view in figure 1. C, C, are two feeding or delivering rollers of the same length as the rollers A and B. M is a wire grating or sieve (in each division) suspended at the point N on an axle, and having a slight reciprocating motion imparted to it by two pins or cams protruding from the shaft S, which latter is connected by a belt with the roller B. E, E, E, are chambers covered with fine wire woven sufficiently close to allow the air to escape without the fur. The machines being
525 set in motion, and the workman having commenced spreading the fur upon the endless web connecting A and B at the feeding end of the machine under I, the principal mass of the fur is carried forward and drawn into the first compartment by the feeding-rollers C, C, while the finer particles are driven or wafted by the quick revolutions of the cylindrical picker D into the upper place E, and thrown upon the feed-apron of the next compartment, the grosser and heavier particles falling upon the wire grate M. Such part of these last particles as consist of hair fall through the wire grate into the space or box H, and such of them as consist of dags and dirt are shaken off by the motion given as above described to the wire grating or seive M into the space G. The fur which is wafted or thrown on to the feed-apron of the succeeding compartment, will in like manner be drawn through the second compartment, and so in like manner through the third compartment, or any further number of compartments, and be ultimately brought out by the last pair of delivering rollers C, C, at the further end of the machine. If it be intended to use a thread composed partly of fur and partly of wool, or partly of fur and partly of silk, or partly of fur and partly of cotton, the fur having been

passed through such blowing-machine as before mentioned, or any other suitable blowing-machine, or having been otherwise cleared from kemps and hair, may then be mixed with wool, waste silk, or cotton, as may be desired, and (subject to the limitation next mentioned) in such proportions as the manufacturer may think fit, taking care that the different materials shall be well and intimately blended. The better to secure such intimate mixture the mass should be twice passed through the said blowing-machine or other suitable machine. The limitation to which I have drawn attention above is this, that if waste silk or cotton be used to mix with the fur, the proportion of each should not exceed one-third in weight of the fur, with which it is to be mixed. Although, also, I have mentioned waste silk, because of its cheapness and applicability, yet the manufacturer may, if he thinks fit, use raw silk in place of waste silk, and when either waste silk or raw silk is used, exceeding three or four inches in length, it should be cut into pieces of about that length. The fur, or the mixture of fur and wool, or of fur and silk, or of fur and cotton, or as the
526 case may be, which has been obtained from the blowing material, is placed upon a common carding-engine and passed through the same, whence it is obtained in rolls or roving, after which it is reduced into thread and twisted by any convenient method now in practice for reducing and twisting the rolls or roving of wool, silk, or cotton into warp or woof. The thread of fur, or of fur and wool, or of fur and silk, or of fur and cotton, as the case may be, having been thus obtained, the same may be then manufactured into hosiery, or woven with or without admixture with other threads into shawls and blankets, or be woven along with threads of wool into cloth, or be woven without admixture with any other thread into cloth, or woven as or for the pile of velvet or plush, or be woven as or for the pile of rugs or carpets, all according to any of the modes of weaving and manufacture now in use.

Now in reference to the improvement first and immediately hereinbefore described, I do not claim as new any of the machinery which I employ in respect to performing the same, but I claim as new the employment in the manufacture of hosiery, shawls, blankets, rugs, and carpets, and of long continuous tissues or fabrics, called or known as cloths, stuffs, velvets, and plushes, or by whatever other name they may be known; firstly, of a thread or yarn composed wholly of the fur of the hare, rabbit, beaver, muskrat, nutria, otter, or raccoon; secondly, of a thread or yarn composed partly of such fur and partly of wool; thirdly, of a thread or yarn composed partly of such fur and partly of silk, in the proportion before mentioned; and fourthly, of a thread or yarn composed partly of such fur and partly of cotton, in the proportion before mentioned.

Another of the said improvements consists in manufacturing shawls, carpets, rugs, blankets, and long continuous fabrics or cloths suitable for various useful purposes, of or with the said furs before named, or any of them, either alone or mixed with wool, or with silk, or with cotton, or with dressed flax, or with hemp, or with tow, or by means of causing the materials used to intertwist, interlock, and mat together, and form a close firm texture, without the aid or addition of

any adhesive mixture, and without the operation of weaving being at all required. The mode of performing this second improvement is as follows: The fur to be used I first clean in the manner before
527 mentioned, and such fur may be mixed with wool, or any proportion the manufacturer thinks fit, or be mixed with silk, cotton, dressed flax, hemp, or tow, according to the article which the manufacturer is desirous of producing, and the mixture may be effected in the manner hereinbefore described, or by any other convenient method, but the silk, cotton, dressed flax, hemp, or tow, (which I call non-felting materials,) used in the mixture with fur for the purposes of carrying into effect the improvement now being described, should be in the proportion of about one-third only of the same by weight to two-thirds in weight of the fur used, as a greater quantity of non-felting materials than about one-third will prevent or discourage the felting, which takes place as hereinafter described. I should here remark that if any of these non-felting materials should exceed the length of three or four inches, they should be cut by the readiest means into lengths not exceeding three or four inches. The fur or other materials employed should be passed through a blowing-machine, and I prefer such as has been hereinbefore described. As the material is delivered from the last pair of rollers of the said machine a revolving cylinder covered with card teeth, commonly called a fancy cylinder, as shown in figure 1, and marked A, causes, by reason of its revolving with great rapidity, the material to be thrown on the above wire cylinder, marked B B, in the said figure 2, where, by means of the exhaustion underneath and through the said last-mentioned cylinder, the material is retained and formed into a bat or fleece, after which, by the revolution of the said woven wire cylinder, it is made to enter and pass between the two metal rollers C, C, on the said figure 2, the upper one resting upon the other, whereby the bat is partially compressed. The bat, after passing through these rollers, is conducted between two sets of wooden or metal rollers, as shown in said figure 2, marked D, D, both of which should be covered with several folds of cloth; between the two sets of rollers a horizontal steam-pipe, finely perforated on its upper surface, is placed directly under the bat for the purpose of steaming and moistening the bat as it passes from the uncovered to the covered set of rollers. The upper of the covered rollers is made to receive a short alternating motion by means of a lever E, figure 2, which hardens and partially fills
528 the bat. It will be advisable, where the felting materials used are of inferior felting quality, to have a second, third, or more pair of covered rollers, all receiving, by means of similar levers attached to the upper roller of each pair, a similar alternating motion, as before described, in order more completely to cause the bat to felt. The bat should be conducted through these further sets of rollers, and they should be at about the same distance from each other as the said sets of rollers C, C, and D, D, and between each set of the further rollers a similar perforated steam-pipe should be fixed. The hardened bat, after passing off the rollers D, D, or the further sets of similar rollers which may be employed, is now cut off into convenient lengths and passed through any suitable felting or planking machine, but I

prefer using two planking machines constructed according to the description following, (that is to say:) figures 3^a, 3^b, 3^c, contain a plan and two sections of a machine to be used for planking, reducing, or felting. A A is a frame or stand on which is placed a trough containing water slightly impregnated with sulphuric acid, or with the dregs of beer, and kept boiling by a coiled steam pipe, marked C, lying at the bottom. D, D, are rollers formed of a composition of zinc and lead, or other suitable metallic substance, each pair being geared at their ends by pinions E, and the upper roller of each pair geared into the horizontal worm or screw F by the spur-wheels G, G. L, L, are levers, having the weights M, M, bearing upon them, suspended to such upper roller for the purpose of giving a slight pressure to the material being felted. I is an inclined board for the purpose of giving the material or bat, when laid thereon by the workman, a direction toward the roller. K K is a fast and loose driving pulley on the worm-shaft F. The machinery being set in motion the material or bat is placed upon the inclined board I and drawn forward, and by keeping the bottom rollers and portion of the top rollers immersed in the boiling mixture, as shown by the dotted line, the bat is continually exposed to the action of the same till it comes out at the further end. The bat may be passed through the machine twice, thrice, or as often as may be necessary to render it sufficiently tight and close in texture.

529 The number of rollers may be varied in the different machines, according to the substance of the bat, and the quantum of work or felting required. It is to be observed, however, that the pressure thus given to the bat is in its longitudinal direction only. Now it is advisable that it should also receive pressure or rubbing (accompanied with heat and moisture) in a lateral or horizontal direction, I carry therefore or direct the bat from the last-mentioned machine or to another planking machine, which is represented in figures 4^a, 4^b. A is a thick plank formed of a composition of zinc and lead, or other suitable metallic substance, and supported on a suitable frame, having its upper surface composed of a series of semi or nearly semi-cylinders of adequate strength and substance to bear pressure. These semi-cylinders are of the same diameter as those in the last-mentioned planking-machine. The length of each of these semi-cylinders, which are severally marked C in the drawing, or side view, figure 4^a, may be the same as the length of the cylinders of the planking machine first described, and the cloth or fabric passed over them, as after mentioned, should always be about an inch less in width than the length of these cylinders. This plank of semi-cylinders is made to have an alternating motion from end to end in the line of the cloth placed upon them, and the extent of this alternating motion is increased by the distance from the top of one semi-cylinder to the top of the adjoining semi-cylinders. This alternating motion of the plate is advisable, as the pressure upon the bat laying on the semi-cylinders will be constantly varying.

Figure 4^a shows the appearance and mode of construction of the top plate, and the situation of the steam-pipes between each semi-cylinder, as next described. To show more clearly the mode of construction, the necessary feed-pipe for steam has been here omitted.

Between each semi-cylinder at the points S are placed pipes along the whole length of the cylinders, having their upper surfaces finely perforated for the emission of steam. Or in lieu of pipes a narrow slip of perforated metal may be soldered or fixed between each two semi-cylinders, an inch from or above the line or point of the junction of the semi-cylinder. These pipes or conduits should have their orifices at each end connected with the feed-pipe, part of which, F F, is shown in the separate drawing, figure 4ᵇ. The same cylinders
530 may also be made hollow, as represented at the points H, in the drawing figure 4ᵇ, so as to receive steam to keep them hot. In this case the steam would be conveyed from the aforesaid feed-pipe F F into the cylinders. The feed-pipe at the one end of the cylinders should be slightly elevated, say an inch and a half above the feed-pipe at the other end, and so in like manner the bottom of the hollows of the cylinders, and the bottom of the cross steam-pipes or conduits, should, at the end where the feed-pipe is highest, be about one and a half inches higher than the bottom of such hollows and the bottoms of such cross pipes at the end where the feed-pipe is on the lower level; and there should be a gentle declination in the said hollows and the said cross-pipes from the aforesaid higher level to the last-mentioned lower level, by which means the condensed steam or water will drain into the feed-pipe on the lower level, and from thence be run off to waste into any convenient vessel attached to the opposite side of the pipe from that where the steam enters. R is a large heavy roller or cylinder made of the aforesaid metal, which, by the application of suitable power, is made to travel to and fro across the top of the semi-cylinders. There may be several of these rollers, and it is desirable to use several. The bat having passed through the former planking-machine, is brought, pulled, or conducted on to the machine last described and across the whole of the semi-cylinders. The steam is then allowed to enter the pipes, and the rollers R are made to traverse across the semi-cylinders, and after passing many times across them, so as thoroughly to rub the bat horizontally, the rollers should be lifted up by means of straps attached to their ends, and by suitable machinery placed above the same, and the position of the rollers should be then shifted so as to make them travel angularly, first, several times in one direction, and afterwards, by being again properly shifted, from angle to angle in the opposite direction. During all the time that the upper rollers are travelling, whether horizontally or angularly, the plate with the semi-cylinders should be made to move backwards and forwards in the direction and with the alternating motion before described. This rubbing horizontally and angularly is continued until every portion of the bat laying
531 across the semi-cylinders has been thus well rubbed or rolled.

The upper rollers are then lifted by means of the straps and machinery aforesaid off the bat, which is then pulled forward to the extent of the distance between the tops of the two outer semi-cylinders, and thereupon the above process of rolling is repeated with or to this fresh portion of the web; and in this manner the whole web, which has passed through the first-mentioned planking-machine, is, by the means lastly mentioned, thoroughly rubbed or rolled horizon-

tally and angularly, while, at the same time, it receives heat and moisture. In order that the upper rollers may travel angularly it may be advisable to place the top plate and semi-cylinders in a bed of wood or metal, the top of which should be on the same level as the tops of the semi-cylinders, or without such a bed for a resting place or support, some of the rollers, especially the outer ones of the series, might fall off. The bat, after these operations, becomes of a close, firm texture, when it may be napped and sheared in like manner as woven woollen cloths are napped, and may be dyed, printed, or finished in any style that may be desired, with or without shearing.

Now I am aware that hat-bodies have been made by means of felting, chiefly by hand, and also by means of machinery, and that hat-bodies have been made of some of the materials and mixtures hereinbefore mentioned, and therefore I do not claim the manufacture of hat-bodies out of or with the materials before mentioned, or by means of felting. And I am also aware that a substance or fabric of the nature of felt has been and is manufactured, and of any length, by uniting fibrous materials by means of an adhesive mixture in which they are immersed, as explained in the specification of the patent of William Wood, dated ninth March, one thousand eight hundred and fifteen, and in the specification of the patents granted to Thomas Robinson Williams, dated twenty-third May, one thousand eight hundred and twenty-nine, and ninth March, one thousand eight hundred and thirty-three, respectively. And I do not therefore claim the manufacture of shawls, carpets, rugs, blankets, and long continuous fabrics and cloths by means of that mode of felting, or process called felting, which unites the materials used in forming the same
532 with any adhesive mixture; but I claim as new the manufacture of shawls, carpets, rugs, blankets, and long continuous fabrics and cloths, consisting wholly of fur, or partly of fur and partly of wool, or partly of fur and partly of silk, or partly of fur and partly of cotton, or partly of fur and partly of dressed flax, or partly of fur and partly of hemp, or partly of fur and partly of tow, by causing the fur and wool, the fur and silk, the fur and cotton, the fur and flax, the fur and hemp, and the fur and tow to intertwist, interlock, and mat together, as hereinbefore described, without the application of any adhesive mixture.

Another of the improvements consists in the manufacturing shawls, carpets, rugs, blankets, and long continuous fabrics or cloths suitable for various useful purposes, consisting wholly of wool, or of wool mixed with silk, or with cotton, or with dressed flaxed, or with hemp, or with tow, by means of felting alone, that is to say, by causing the articles or materials used to intertwist, interlock, and mat together and form a close firm texture without the aid or addition of any adhesive mixture, and without the operation of weaving being at all required. And the mode of performing this improvement is as follows: The wool to be used may, if not used alone, be mixed with silk, flax, hemp, or tow, according to the article which the manufacturer is desirous of producing, care being taken as aforesaid that the lengths of the fibres used do not much exceed four inches, and the mixture should be made or brought about in the manner hereinbefore described with

reference to the mixing of fur with wool, silk, or cotton, but the proportion of silk, cotton, dressed flax, hemp, or tow used in the mixture with wool, for the purposes of carrying into effect the improvement now being described, should be in the proportion of about one-third of the same by weight to two thirds in weight of the wool used. The wool, if used alone, or if so mixed with either of the last-mentioned substances, is then to be passed through a proper blowing-machine, but I prefer such blowing-machines as has heretofore been referred to and described; and as the material is delivered from the last pair of rollers of the said machine, each material must be made to pass through the hardening machine hereinbefore described, Figure 2, in
533 order to form the same into a well consolidated bat. In the case of this improvement, also, it will be advisable, where the materials used are of an inferior felting quality, to have a second, third, or more pairs of covered rollers, all receiving, by means of the upper roller of each pair, a similar alternating motion, as before mentioned in describing the said machine, in order more completely to cause the bat to felt. The hardened bat is now cut off into convenient lengths and passed through the said planking machines hereinbefore described, until the same has become of a close firm texture, when it is ready for napping and shearing, if required, in like manner as woven woollen cloths are napped and sheared, or to be dyed, printed, or finished in any style that may be desired, with or without shearing.

Now I am aware that hat-bodies have been made by means of felting, chiefly by hand, and also by means of machinery, and that hat-bodies have been made of some of the materials and mixtures lastly hereinbefore mentioned, and therefore, I do not claim the manufacture of hat-bodies out of or with the materials lastly before mentioned, or by means of felting; and I am also aware that a substance or texture in the nature of felt has been and is manufactured, and of any length, by uniting fibrous materials by means of an adhesive mixture in which they are immersed, as explained in the specification to the patent of the before-mentioned William Wood, dated ninth of March, one thousand eight hundred and fifteen, and in the specification to the patents granted to the before-mentioned Thomas Robinson Williams, dated the twenty-third of May, one thousand eight hundred and twenty-nine, and ninth of March, one thousand eight hundred and thirty-three, respectively, and I do not claim, therefore, the manufacture of shawls, carpets, rugs, blankets, and long continuous fabrics or cloths by means of that mode of felting, or process called felting, which unites the materials used in forming the same with any adhesive mixture; but I claim as new the manufacture of shawls, carpets, rugs, blankets, and long continuous fabrics, consisting either wholly of wool, or partly of wool and partly of silk, or partly of wool and partly of cotton, and partly of wool and partly of dressed
534 flax, or partly of wool and partly of hemp, or partly of wool and partly of tow, by causing the wool, or the wool and silk, the wool and cotton, the wool and dressed flax, the wool and hemp, and the wool and tow, to intertwist, interlock, and mat together, without the application of any adhesive mixture.

Another of the improvements consists in manufacturing, by means of the process of felting, coarse fabrics of a close, firm texture, suitable for coarse carpets, hair carpets, rugs, horse-blankets or cloths, and many other useful purposes of or with the hair of horses, cows, oxen, or other cattle, prepared as after mentioned, either alone or mixed with wool or dressed flax or hemp cut into short lengths, or with tow, or with refuse hair obtained from skins which contain fur, or with cotton or waste silk. If the hair of horses, cows, oxen, or other cattle is used, all of which hair I designate hereafter by the term "cattle hair," I prefer that it should be the short hair taken from the bodies of the animals. If the long hairs be used, they require to be cut into lengths of about an inch and a half each. The hair which is to be used alone, or mixed with the substances before mentioned, must be previously cleansed, which I effect in the following manner: I take a quantity of hair and wash the same well in clean water. I then put the hair into any tight wooden vessel and fill up the same so as to cover the hair with water impregnated with sulphurous acid, and such water so impregnated I prefer to be of the strength indicated by six degrees of Twaddle's hydrometer, (an hydrometer well known as a means of ascertaining the specific gravity of liquids,) and I allow the hair to remain in steep in this impregnated liquid from twelve to twenty-four hours, and I then take the hair and wash the same again well in pure clean water. I next dry the hair thoroughly, after which it is fit for felting. The hair so cleansed and dried may be then, either by itself alone, or mixed with wool, or with dressed flax or hemp cut into short lengths, or with tow, or with cotton, or with waste silk, or with refuse hair, be at once felted into a fabric of a close, firm texture, by means of heat, moisture, and rubbing or rolling performed by manual labor, as at present practiced with reference to making felted hat-bodies of wool or fur. Or such hairs so cleansed and dried, either alone or mixed with wool, with dressed flax or hemp cut into short lengths, or with tow, or with cotton, or with waste silk, or with the refuse hair aforesaid, may be passed through a proper blowing-machine, but I prefer such a machine as has hereinbefore been described; and as the material is delivered from the last pair of rollers of the said machine, such material must be made to pass through the machine hereinbefore described, figure No. 2, in order to form the same into a hardened bat. The bat, when sufficiently hardened by passing through two or more pairs of covered rollers of the last-mentioned machine, is now cut off into convenient lengths and passed through the two planking-machines, such as have hereinbefore been described. Of course, when a portion of the mixture used is a non-felting material, such as cotton, flax, hemp, or tow, the proportion used thereof must not exceed about one fourth by weight of the prepared cattle-hair used.

Now I am aware that a substance or texture in the nature of felt has been and is manufactured, and of any length, by uniting hair and fibrous materials by means of an adhesive mixture in which they are immersed, as explained in the specification to the patent of the before-mentioned William Wood, dated ninth of March, one thousand eight hundred and fifteen, and in the specification to the patents

granted to the before-mentioned Thomas Robinson Williams, dated the twenty-third of May, one thousand eight hundred and twenty-nine, and ninth of March, one thousand eight hundred and thirty-three, respectively, and I do not, therefore, claim the manufacture of fabrics suitable for coarse carpets, rugs, horse-blankets or cloths, and other useful purposes, by means of that mode of felting which unites the materials used in forming the same with or by means of any adhesive mixture. And whereas I am also aware that a loose sheathing or imperfectly felted substance, which may be called basoned felt, has been manufactured wholly or partially of cattle hair unprepared, and by hand, for the purpose of being applied principally to steam-engine boilers as a non-conducting material, and for sheathing ships, I declare that I do not claim the manufacture of any such loose sheathing or basoned felt, or any machine particularly adapted for the
536 purposes of producing the same; but I claim as new the manufacture of coarse tissues or fabrics, or cloths suitable for coarse carpets, rugs, horse-blankets or cloths, and other useful purposes, of a close, firm, well planked texture or consistency, composed of cattle-hair alone, prepared as hereinbefore described, by the application of sulphurous acid, or of such cattle-hair so prepared as aforesaid mixed with wool, or with dressed flax or hemp cut into short lengths, or with tow, or with cotton, or with waste silk, or with refuse hair aforesaid I claim also as new the application of sulphurous acid to the hair in manner hereinbefore described, for the purpose of enabling the same to be made readily, and closely felted or formed.

Another of the improvements consists in making blankets suitable for horse-blankets or cloths and horse hosiery by means of felting, and of a shape more accurately to fit the animal than is now generally effected; and I perform this improvement as follows: I take either wool, fur, or hair, the latter prepared with or by sulphuric acid, as hereinbefore described, or such other of the mixtures capable of felting as are hereinbefore mentioned, and I spread the same of the requisite thickness upon the forms or molds of the shape of portions of a horse, as described in figure 5, 5^b, 5^c, and 5^d. The forms or molds must be considerbly larger than the natural animal, to provide for shrinking. Figures 5^a, 5^b, 5^c, and 5^d are drawings of molds of portions of the side of a horse and legs. These molds should be of copper or other suitable metal, and all be finely perforated with small holes. The operator having placed on the mold the felting substance of which he intends to make the fabric, and having spread it equally of the desired thickness, he then covers the same, being the bat, with a cloth. The mold being placed under a steam pipe, steam is allowed to escape under the mold, and the operator at the same time rubs the bat in like manner as is now practiced by hatmakers in basoning hat-bodies. The bat thus becomes basoned or hardened, and the operator proceeds to felt or plank the same into a close firm texture, by means of heat and moisture, and of rubbing or rolling, in like manner as is now practiced in felting or planking hat-bodies; and after the fabrics shall be sufficiently felted, and
537 while they are in a damp and hot state, they should be put on a wooden mold of a complete horse standing on legs, and the

various fabrics should be then put on such portions of this wooden horse as fitted them, and they should be pressed into the shape of the animal, and the wooden horse, with the various fabrics or portions of the complete horse-cloth so affixed to it, should be placed in a heated chamber, where the fabrics will dry keeping their shape. These fabrics may then be joined, by sewing or otherwise, in such manner as the manufacturer shall see fit, into horse cloths and horse hosiery.

And in reference to the improvement lastly described, I claim as new the manufacture of a fabric or fabrics suitable for horse-blankets or cloths and horse hosiery, by means of making the same, as hereinbefore described, upon the molds of the form of a horse, so as to cause such horse-cloths and hosiery to fit closer to the body and legs of the animal than the horse-cloths at present in use.

Another of the improvements consists in applying to the manufacture of hosiery, shawls, carpets, rugs, and other fabrics or cloths, a thread or yarn composed partly of wool and partly of tow, or partly of wool and partly of well dressed flax cut into short lengths of not more than three or four inches; and I perform the said last-mentioned improvement as follows: The wool in the proportion of about two-thirds of wool to one-third of such tow or of such dressed flax cut into short lengths, should be passed through the blowing-machine before described, or be otherwise well mixed, and the mixture thus obtained should be placed upon the common carding-engine, whence it will be obtained in rolls or roving and should be then reduced into thread and twisted by any convenient method now in practice for reducing and twisting the rolls or roving of wool, silk, or cotton into warp or woof. The thread of wool and tow, or of wool and dressed flax, thus obtained, and of the quality which the manufacturer may desire, may then be manufactured into hosiery, or woven, with or without admixture with other threads, into shawls, or the same may be woven along the threads of wool or fur into fabrics or cloths, or be woven, without admixture with any thread,
into fabrics or cloths, or be woven as or for the pile of rugs or
538 carpets, and all according to any of the ordinary modes of weaving or manufacturing such articles.

And in reference to this last-mentioned improvement I claim as new the application to the manufactures last mentioned of a thread composed in the proportion before mentioned, partly of wool and partly of the tow in common use, or partly of wool and partly of the well-dressed flax in common use, cut into short lengths.

Another of the improvements consists in applying to the manufacture of hosiery, shawls, and other fabrics or cloths a thread or yarn composed partly of cotton and partly of tow, and I perform the said last-mentioned improvement as follows: The cotton and tow last mentioned, in such proportions as the manufacturer think fit, should be passed through the blowing-machine before described, or be otherwise well mixed, and the mixture thus obtained should be placed upon the common carding-engine, whence it will be obtained in rolls or roving, and should be then reduced into thread and twisted by any convenient method now in practice for reducing and twisting the rolls of roving of wool, silk, or cotton into warp or woof. The thread of cotton and tow having been thus obtained, and of the quality which the manufacturer

may desire, the same may then be manufactured into hosiery, or woven, with or without admixture with other threads, into shawls and cloths or fabrics of such length, size, and shape as the manufacturer shall think fit.

And in this last-mentioned improvement I claim as new the employment in the manufacture last mentioned of a thread composed partly of cotton and partly of the tow in common use.

Another of the improvements consists in applying to the manufacture of hosiery, shawls, carpets, rugs, and other fabrics or cloths, a thread or yarn composed partly of wool and partly of the tow of New Zealand flax, or partly of wool and partly of well dressed New Zealand flax, cut into short lengths of not more than three or four inches; and I perform the said last-mentioned improvement as follows: The wool in the proportion of about two-thirds of wool to one-third of such New Zealand tow, and of such dressed New Zealand flax, cut
539 into short lengths, should be passed through the blowing-machine before described, or be otherwise well mixed, and the mixture thus obtained should be placed upon the common carding-engine, whence it will be obtained in rolls or roving, and should then be reduced into thread and twisted by any convenient method now in practice for reducing and twisting the rolls or roving of wool, silk, or cotton into warp or woof. The thread of wool and New Zealand tow, or of wool and dressed New Zealand flax, thus obtained, and of the quality which the manufacturer may desire, may then be manufactured in the usual mode into hosiery, or woven, with or without admixture of other threads, into shawls, or the same may be woven along with threads of wool or fur into fabrics or cloths, or be woven without admixture with any other thread into fabrics or cloths, or be woven as or for the pile of rugs or carpets.

And whereas the use of New Zealand flax cut into short lengths, or of the tow of New Zealand flax mixed with wool, in the manufactures lastly mentioned, is, to the best of my knowledge, new, therefore I claim the application to the manufactures lastly mentioned, of a thread or yarn composed, in the proportions before stated, partly of wool and partly of the tow ot New Zealand flax, or partly of wool and partly of well dressed New Zealand flax cut into short lengths.

Another of the improvements consists in applying to the manufacture of hosiery, shawls, and other fabrics or cloths, a thread or yarn composed partly of cotton and partly of the tow of New Zealand flax, partly of cotton and partly of dressed New Zealand flax, cut into, short lengths of not more than three or four inches; and I perform the said last-mentioned improvement as follow: The cotton and New Zealand tow, or cotton and dressed New Zealand flax last mentioned, in such proportions as the manufacturer thinks fit, should be passed through the blowing-machine before described, or be otherwise well mixed, and the mixture thus obtained should be placed upon the common carding-engine, whence it will be obtained in rolls or roving, and and should be then reduced into thread and twisted by any convenient method n w in practice for reducing the rolls or roving of wool,
540 silk or cotton into warp or woof. The thread of cotton and New Zealand tow, or of cotton and dressed New Zealand flax,

having been thus obtained and of the quality which the manufacturer may desire, the same may be manufactured in the usual mode into hosiery, or woven in the usual mode, with or without admixture with other threads, into shawls and cloths of such length, size, and shape as the manufacturer shall think fit.

And whereas the use of New Zealand flax cut into short lengths, or of the tow of New Zealand flax mixed with cotton, in the manufactures lastly mentioned, is, to the best of my knowledge, new, therefore I claim the application to the manufactures lastly mentioned of a thread or yarn composed partly of cotton and partly of the tow of New Zealand flax, or partly of cotton and partly of dressed New Zealand flax, cut into short lengths.

Another of the improvements consists in forming a fabric suitable chiefly for carpets and rugs, but which may be applied as a cloth for hanging on walls, for coverings to furniture, and for other ornamental or useful purposes, by useing the threads of worsted or silk or other fibrous materials cut into short length about half an inch in length, and while upright on their ends, and packed together and forming two surfaces, to cause one of the surfaces thereof to adhere, by means of dissolved caoutchouc or other suitable adhesive substance, to a cloth or canvas back, either of woolen, linen, or cotton, leaving the other of the said surfaces a nap; and the mode in which I carry into effect this improvement is as follows: I take a frame of wood with sides half an inch deep, and which may be of a yard square, or of any other convenient dimensions or shape, and the sides may be of any thickness, but the depth of the frame should not exceed about half an inch. This frame has a top and a bottom, each of which can be screwed on and taken off at pleasure. The bottom being fixed on the frame, it should be placed on the ground or a table, and each bit of worsted or silk, or other fibrous material which may be used, not exceeding about half an inch in length, is placed upright on one of its ends inside the frame, and so the operator proceeds until the frame is crowded full of threads of equal length, standing close together, all on their ends, and having the appearance at the top of a texture like in
541 appearance to a Tournay or Turkey carpet. The operator may place these threads at random, or form them into paterns, as he may think fit, but it is indispensable that all should be nearly of the same length, and that all should stand upright on their ends, and that they should be about the same height as the sides of the frame, so that when the top has been fixed on the frame all the threads may be kept in their places without disturbance. When the frame has been filled, and the operator is satisfied with the closeness of the mass of threads and the pattern he has formed, the upper lid or top of the frame is then put on and fastened down, and the frame is then turned over and made to lay flat upon its top. The bottom is then unscrewed and taken off, when the operator applies to the ends of the threads exposed by the removal of such bottom dissolved caoutchouc, or other suitable adhesive substance. This must be done with care, so as not to disturb the threads, and so as not to allow the dissolved caoutchouc or other adhesive substance to penetrate beyond an eighth of an inch, or thereabouts, into the mass of threads. A cloth or can-

vas back, or other appropriate material, about two inches larger all round than the size of the frame, and which may, if the operator pleases, be spread with a like adhesive substance, is then applied to the coated surface and pressed down with a tailor's goose or iron, or other suitable instrument, until the adhesion has taken place. The frame is now again reversed, without replacing the bottom, when the threads adhering to the cloth or canvas back, or other appropriate material, will drop out or be pushed out by removing the top. The fabric then is left to dry, and if it be intended to use the fabric so made alone, without joining it to other like pieces, the outside edges of the nap should be protected by having a belt of suitable fringe or woven stuff affixed close to such edges, upon the margins of the cloth or canvas back to which the said nap shall have been affixed as aforesaid. If dissolved caoutchouc be used, great care must be taken in obtaining it of good quality, and free from any unpleasant effluvia. The frame, when cleansed, may be again used to form another like texture,

and different pieces may be joined together by passing the
542 cloth or canvas back of one piece under the adjoining cloth or canvas back of another piece, and causing them to adhere by means of dissolved caoutchouc or other suitable adhesive substance. Although I have described the mode of carrying into effect the last mentioned improvement, as if the operator placed every thread in its place by hand, yet it will be obvious that in order to construct such textures with greater rapidity other modes may be adopted for filling the frame used. Another mode of carrying the same into effect may also be to make a pattern or design by drawing the ends of long threads of worsted, of cotton, of silk, or of other fibrous material, through the holes of a perforated plate; and when the pattern has been formed, the threads below should be sustained, so as not to allow their own gravity to draw their upper ends from out of the holes through which they have been passed. The ends of the threads should be then cut so as to form an even surface or pattern, and this being completed, this surface should be smeared with the dissolved caoutchouc or other adhesive substance, and a cloth or canvas back, or other appropriate material similar to that before described, should be laid upon or affixed to such smeared surface, and when sufficiently dried the cloth should be pulled upwards so as to draw the threads about half an inch above the upper surface of the plate. A very sharp cutting instrument or sword should be then introduced nearly close to the upper surface of the plate, and the thread severed, when the pattern will be found on the surface of the nap which will be formed by the threads so severed, and which will be held together by the adhesive substance and cloth or canvas back, as before described. This being finished, a like process is carried through, commencing with smearing the surface of the threads which will remain exposed after such severance, and this process may be repeated as often as the length of the threads will allow, thus making many fabrics of the same pattern. Care must always be taken in pursuing the plan just described to keep the threads supported below, so that none be drawn out of the holes, which would disarrange the pattern; and caution must be used in drawing up the threads through the holes, that the cloth or

canvas back which has been affixed be not torn or dragged away
543 from the surface of the threads to which it has been affixed. If the operator thinks fit he may turn the face of the plate downwards, so that the threads may be drawn downwards instead of upwards, and the process above mentioned be carried on. But in whatever manner such fabrics or tissues may be made, whether in a frame or by the method last described, or otherwise, nevertheless all such methods will result in this—that short threads of worsted or silk, or other fibrous materials, of equal or nearly equal length, and standing upright or nearly upright, will be joined to a cloth or canvas back, or other appropriate material, with a suitable adhesive substance at one end of the same threads, leaving the other ends of the same threads exposed, and forming a nap or surface.

And I claim as new, and as one of the improvements in the manufacture of carpets, rugs, blankets, and other fabrics, the formation of a texture or fabric by means of short threads as aforesaid, joined by a suitable adhesive substance to a cloth or canvas back or other appropriate material at one end of the threads, while the other end of the threads is exposed, and forms a surface or nap.

Another of the improvements consists in forming a texture or fabric fit for rugs, carpets and other useful purposes as follows: I take a frame, which may be of the size of a yard square, or larger or smaller, as the operator may think fit. This frame is composed of wires or of thin strips of metal placed parallel, and with their edges upwards to each other, and fixed into the wooden work of the frame. The wires or strips of metal should not be more than the sixteenth of an inch apart. I then take any woven cloths, and of any color, as may please my fancy, and I pass the same edgewise through between the wires or strips of metal, and this will cause the edges of the cloth all to make their appearance above the wires. When this has been done, and the pattern formed by such edges of the cloth is satisfactory to the operator, he should then cut the same edges of the cloth so as to form an even surface or pattern, and, this being completed, this surface should be smeared with the dissolved caoutchouc or other adhesive substance, and a canvas or cloth back, or other appropriate material similar to that before described, should be laid upon or affixed to such smeared surface, and, when sufficiently dried,
544 the canvas should be pulled upwards or downwards, according to the position of the frame, so as to draw the edges of the cloth, not exceeding half an inch, beyond the surface of the plate; a very sharp cutting instrument should then be applied nearly close to the surface of the plate, and the woven cloth severed, when the pattern will be found on the surface of the nap, which will be held together by the adhesive substance and canvas or cloth back, or other appropriate material, as before described. This being finished, a like process is carried through, commencing with smearing the surface of the threads of the woven cloth which then remain exposed after such severance, and this process may be repeated as often as the length of the woven cloth placed edgeways, as before described, will allow, thus making many fabrics of the same pattern. Care must be taken, in pursuing the plan just described, to keep the cloths placed

edgeways between the wires or strips of metal so supported, as that none be drawn out of the frame, for any one being drawn out or slipping out would disarrange the pattern; and caution must also be used in drawing up or down (previous to proceeding to cut the woven cloth) through the parallel wires or slips of metal, in order that the canvas or cloth back, or other appropriate material which has been affixed, be not torn or dragged away from the surfaces of the edges aforesaid of the cloths to which it has been affixed; and I recommend in practicing this last-mentioned improvement, that the operator should have the cloths so to be placed between the parallel wires or strips of metal woven specially for the purpose, as this will enable him to direct them to be done of the varieties of color he may desire, and he should have them made so that while the warp threads may be of any desired length, and of any suitable material, quality, color, or degree of closeness that may be wished for, the woof threads should be but few in number, and at a considerable distance apart, as the woof threads would be of no use except in keeping the cloths together while they were being handled or held, or being drawn between the parallel wires or strips of metal aforesaid. Indeed, when cloths thus specially made are used, the woof threads should be pulled out and removed as soon as they pass through and appear above the upper surface of the wires or strips of metal aforesaid.

515 And in reference to the last-mentioned improvement I claim as new, as one of the improvements in the manufacture of carpets, rugs, blankets, and other fabrics, the formation of a texture or fabric by means of short strips of cloth, as aforesaid, joined by a suitable adhesive substance to a cloth or canvas back, or other appropriate material, at one end or edge of the said strips, while the other end or edge of the said strips is exposed and forms a surface or nap.

And having now described the said invented improvements, and specified what I claim in respect of each of the articles manufactured or produced by means of the said improvements, I further declare that I also claim as new the machine for forming the bat, as hereinbefore described and represented in the said drawing hereunto annexed, and marked figure 2; as also for better felting the said bat, the second-mentioned planking machine, represented in figures 4^a, 4^b. But I do not claim the parts individually of the said machines, but the combination of the said parts producing the machines aforesaid, as useful for the purposes of the said invented improvements, or one or other of them; neither do I claim the said blowing-machine No. 1, nor the first-described planking-machine, figures 3^a, 3^b, and 3^c, as new, both of which machines have been used in and about the manufacture of hat-bodies.

And such the said invented improvements being, to the best of my knowledge and belief, new, I claim the same as new, and declare this to be a true specification thereof.

In witness whereof, I, the said William Angus Robertson, have hereunto set my hand and seal, this fourth day of October, one thousand eight hundred and thirty-eight.

W. A. [L. S.] ROBERTSON.

And be it remembered that on the fourth day of October, in the year of our Lord 1838, the aforesaid William Angus Robertson came before our said lady the Queen in her chancery, and acknowledged the specification aforesaid, and all and everything therein contained and specified, in form above written. And also the specification aforesaid was stamped according to the tenor of the statute made for that purpose.

Enrolled the fourth day of October, in the year of our Lord one thousand eight hundred and thirty-eight.

LYNCH.

547 A. D. 1839. No. 7935.

Manufacture of hats and felt.—Ponsford's specification.

To all to whom these presents shall come, I, William Ponsford, late of Wangye House, in the county of Essex, now of Lower Islington, in the county of Middlesex, gentleman, send greeting:

Whereas her most gracious Majesty Queen Victoria, by her letters patent under the great seal of Great Britain, bearing date at Westminster the twelfth day of January, one thousand eight hundred and thirty-nine, did, for herself, her heirs and successors, give and grant unto me, the said William Ponsford, my executors, administrators, and assigns, her especial license, full power, sole privilege and authority, that I, the said William Ponsford, my executors, administrators, and assigns, and such others as I, the said William Ponsford, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term of years therein mentioned, should and lawfully might make, use, exercise and vend, within England, Wales, and the town of Berwick-upon-Tweed, and also in all her Majesty's colonies and plantations abroad, an invention communicated to me by a foreigner residing abroad, of "an improvement in the manufacture of hats, and an improved description of felt suitable for hats and various other useful purposes, and improvements in preparing the material or materials chiefly used in the manufacture of such felt;" in which said letters patent is contained a proviso, that I, the said William Ponsford, shall by an instrument in writing under my hand and seal, particularly describe the nature of my said invention and the manner in which the same is to be performed, and cause the same to be enrolled in her Majesty's high court of chancery within six calendar months next and immediately after the date of the said in part recited letters patent, as, reference being thereunto had, will more fully and at large appear.

Now know ye, that in compliance with the said proviso, I, the said William Ponsford, do hereby declare that whereas letters patent
548 for England, Wales, and the town of Berwick-upon-Tweed, and also for all her Majesty's colonies and plantations abroad, were granted to William Angus Robertson, of date the fourth day of April, one thousand eight hundred and thirty-eight, for certain improvements in the manufacture of hosiery, shawls, carpets, rugs,

blankets, and other fabrics, communicated to him by a foreigner residing abroad; and whereas, by the specification thereof, afterwards duly enrolled, the said William Angus Robertson declared that some of the said improvements consisted in manufacturing, by means of the process of felting, long continuous fabrics of a close, firm texture of or with wool or fur, with or without certain admixtures therewith, or of or with the hair of horses, cows, oxen, or other cattle prepared in manner detailed in the said specification, and which he proposed to designate generally by the name of "cattle-hair," either alone or mixed with wool or with dressed flax or hemp, cut into short lengths, or with tow, or with refuse hair obtained from skins which contain fur, or with cotton, or waste silk; and whereas the same foreigner, residing abroad, by whom the said last-recited improvements were communicated to the said William Angus Robertson, as communicated to me, the said William Ponsford, certain further and additional improvements which he has invented in the manufacture of felt by which an improved description of felt is produced, and in the preparation of the said cattle-hair for felting, and has also communicated to me a certain improvement in the manufacture of hats, and how the said description of felt may be made applicable to the manufacture of hats and various other useful purposes; and whereas, the said last-mentioned additional improvements and applications are those for which the first hereinbefore recited letters patent were granted to me, the said William Ponsford, now I declare that the said letters patent and the specification thereof are to be considered as having reference to the improvements previously patented by the said William Angus Robertson, and as being supplementary and auxiliary thereto, and I declare that the nature of the said additional improvements and applications, and the manner in which the same are to be performed, are fully set forth and detailed in the following description thereof, and in the explanatory drawings hereunto annexed, that is to say:

549 Firstly, "My improvement in the manufacture of hats," communicated to me as aforesaid, consists in forming the felted bodies of hats wholly of cattle-hair, or of cattle-hair mixed with other materials after the said hair has been prepared, either in the manner directed in the specifications of the said William Angues Robertson, or in the improved manner hereinafter specified. A loose and very imperfectly felted article has been, as stated in the specification of the said William Angus Roberts, manufactured wholly or partially of cattle-hair, and applied as a sheeting to ships, and hat-bodies have been made of felts manufactured from wool and furs, both separately and mixed in various proportions, the one with the other, but I am not aware that a felt made either wholly, or chiefly, or in any considerable proportion of cattle-hair has ever been applied to the making of hat-bodies, and I verily believe this application of cattle-hair felt to be entirely new. The manner in which cattle-hair is recommended, by my informant, to be felted and formed into hat-bodies is as follows:

The hair being cleansed or prepared in the way directed in the specification of the said William Angus Robertson, or in that hereinafter specified by me, should be passed through a blowing-machine, such as is in common use, and then formed into a bat or fleece by means of mechanical arrangements founded on the principle of exhaustion, ex-

plained in the specification of the said William Angus Robertson; that is to say, the hair as it passes from the blowing machine is to be tossed or thrown into the air, from which it is to be sucked or drawn down upon hollow perforated cones or moulds of metal or wood with an exhausting cylinder beneath; when the hair has been received on one of these perforated cones or moulds to a sufficient thickness, a cowl of linen or flannel is to be drawn gently over it, and then a hollow perforated cover of copper, or any other suitable metal, is to be dropped over the cowl; the cone or mould is then to be immersed in a vat or tub of boiling hot water, and there allowed to remain for about a minute, after which it is to be taken out and the metal cover and flannel or linen cowl removed, when the bat or layer of hair will be found felted to a degree that it may be readily finished off by the workman in the usual manner at the oven. If long hairs be
550 used, the hat-body when finished may be combed out so as to cause the hairs to form a rough nap. About a fourth, but not more, of the whole materials used in forming a hat-body, as above directed, may consist of tow, or dressed flax, or waste silk, cut into short lengths of about two inches each; but I declare that, though I have hereinbefore described what my informant considers to be a ready mode and the best mode with which he is acquainted, of felting cattle-hair into hat-bodies, with or without the intermixture of other materials, yet that I do not limit myself to that mode, but claim generally the application of cattle-hair to the making of felted bodies for hats. I proceed—

Secondly, to describe my "improved description of felt suitable for hats and various other useful purposes, communicated to me as aforesaid. The improved description of felt to which I lay claim is a felt made either of cattle-hair, or of wool, or of fur, with or without the admixture with each of small portions of cotton, or silk, or tow, or dressed flax, or other material, observing always that when the fibres of these admixtures exceed three inches in length they should be cut into short lengths of not more than two inches, and so far as concerns the materials employed my improved felt differs in nothing from the felt patented by the said William Angus Robertson; but by certain improvement in the mode of manufacturing the same to be hereinafter described, the felt produced is not only of a closer, and firmer, and stronger texture, and of much greater continuous lengths than any common felts, but closer, and firmer, and stronger, and better finished than even those felts which are made by the process specified by the said William Angus Robertson; and I declare that the manner in which this improved description of felt is manufactured is as follows: I take either cattle-hair, or wool, or fur, with or without an admixture of other materials with each, but in case of admixture following the proportions recommended in the said last-mentioned specification, and I pass them through a blowing-machine, whence the fibres are drawn to and upon an exhausting cylinder, where they are formed into a bat or fleece, which is then passed between a set of hardening rollers, all as described in detail in the before-mentioned specification of the said William Angus Robertson; but, whereas, by the said specification, it is directed that where the felting materials used
551 are of inferior felting quality, the bat should be passed through two or more sets of hardening rollers, similar to and worked

like the set first mentioned. I declare that, in producing my approved felt, whatever may be the quality of the materials employed, the bat is passed through at least two sets or pairs of hardening rollers before it is carried forward to the planking machine, excepting only when the felting material is a wool which does not felt readily, in which case my informant substitutes for an additional set or sets of hardening rollers an apparatus, such as is represented in figure 1 of the drawings hereunto annexed, and of which the following is a description: The figure represents a transverse section view of the apparatus. A, A, is a close hollow cylinder, which turns on a hollow axle B, the outer surface of which axle is perforated all over with small holes to the inner circumference of this hollow cylinder; and along the length thereof are fixed cleets or ribs of about two inches in depth, and about ten inches distant from each other; and at C there is a sliding-door which gives admission into the interior of the cylinder. After the bat has been passed between one or more sets of hardening rollers, and then cut into convenient lengths, the pieces are rolled up and put into bags and introduced into the cylinder A through the sliding-door C, each piece being placed on one of the ribs or cleets on the under half of the cylinder. The cylinder may be advantageously filled to the extent of one quarter of its depth with boiling solution of sulphuric acid and water; the door is then closed, and steam admitted into the cylinder through the hollow perforated axle B till it attains a pressure as indicated by a steam-gauge attached to the cylinder of about fifty inches, when the steam is shut off. The cylinder is then made to rotate at the rate of sixty revolutions per minute. (The appendages and connections by which the steam and water are introduced and regulated, and the cylinder made to rotate, are such as any competent workman will readily supply, and need not be here particularly detailed.) As the cylinder rotates, the pieces of bat will fall from one rib or cleet on to another in succession, and at the end of about twenty minutes they may be taken out, when they will be found in a state of excellent preparation for the planking-machine to which they are to be next transferred.

552 And now as to the planking machine. I further declare that, in the manufacturing of the said improved description of felt, the planking machine employed so far from that described in the specification of the said William Angus Robertson, and represented in figures 3^a, 3^b, and 3^c, of the drawings thereunto annexed, that there is passed round each of the two sets of rollers indicated by the letters D, D, an endless web or band of coarse cloth of linen, wool, or hair, which my informant finds to be a material improvement in the machine, as originally constructed. The addition of these endless webs or bands is shown in figure 2 of the drawings annexed to this present specification. After the bat has been passed as often as the workman may find needful through this improved machine, it is next subjected to a rubbing process, but instead of employing for this purpose machinery such as is described in the specification of the said William Angus Robertson, and represented in the drawings annexed thereto by the figures 4^a, 4^b, and 4_c, which machinery operates horizontally and angularly, an apparatus is made use of whereby the

rubbing is effected by a series of circular motions with a brush or brushes, worked by machinery connected with or forming part of the general system of machinery by which the other processes are performed. Figure 3 of the drawings annexed to this present specification represents a circular rubbing or brushing apparatus of this description. The bat or nearly finished felt is delivered directly from the planking machine, or, where it is of considerable length, delivered through the medium of a hand reel on to an endless cloth or web (*a*, *a*,) passed round the two rollers (*b*, *b*.) affixed to the opposite sides of a flat table A, having two other rollers (*c*, *c*,) fixed immediately over them, so that the bat, when resting on the endless cloth or web, is carried forward between the two sets of rollers. The table A is perforated all over with small holes to let steam pass through from below to the bat or felt, which may be accomplished in many convenient ways, which it would be superfluous for the information of any competent workman to describe. B is a circular brush turning on its centre, the bristles of which are about three-eighths of an inch in length, and which may be so fixed as to press more or less on the bat or felt as it passes beneath. The whole breadth of the table
553 may be occupied by one such brush, (as represented in the drawing,) or by two or more brushes of smaller diameter, and there should be as many circular brushes of one size or other, and so arranged that they shall cover as nearly as practicable the table throughout its *its* full length ; a circular movement being given to all these brushes, they operate so equally, yet variously, on the bat or felt, as it passes beneath them, as to impart to it a high degree of uniformity and finish. Instead of circular brushes turning on their centers, circular pieces of wood or metal with grooved, or diamond, or other figured faces in low relief may be used when there is but little finishing required, or where the felted fabric is of a thin and delicate texture.

And having now described the manner in which the improved description of felt is manufactured, I declare that the various useful purposes to which the same has been hitherto found suitable, that is to say, the articles which may be made of it are chiefly as follows : hats, caps, or bonnets, (when they are made by cutting the bodies out of large pieces of felt, and suitably forming and uniting the pieces cut out so as to form the shape of hats required by the manufacturer, a mode of making felted hat-bodies not heretofore adopted and which may be advantageously practiced, especially with respect to coarse or common hats, or military caps. The labor of felting each individual hat-body by hand, as in the ordinary process,being thus much economized,) printers' blankets, pilot cloths, horse cloths, and carpeting. I also contemplated the application thereof generally to all purposes to which woolen cloths are now ordinarily applied ; all that is necessary to fit it for these purposes being that it should be fulled, dressed, dyed, and otherwise finished as woolen cloths usually are. This improved felt has also been found to make an excellent foundation for imitation leather, as it takes the coating or glazing of varnish well.

I now proceed to describe my "improvements in preparing the material or materials chiefly used in the manufacture of such felt ;" by

the words material or materials, I here mean the cattle-hair before mentioned in all its numerous varieties. The specification of the said William Angus Robertson directs that this cattle-hair shall be prepared or cleansed by means of sulphurous acid, but the experiments of my informant have led him to the conclusion that muriatic
554 acid will serve the purpose better, and the manner in which the said hair is prepared with muriatic acid is as follows: A quantity of hair, which is generally, as bought from the tanners, in a dirty state and mixed with lime, is taken and washed well in clean water; the hair is then put into a wicket basket, and this basket put into a tight wooden vessel fitted in the bottom with a plug to draw off the waste liquor; the basket should be fitted with handles, to enable the operator to move it up and down inside the outer vessel.

The basket being put into the vessel and filled with hair, a quantity of diluted muriatic acid is poured over the hair till it completely covers it. The hair is then moved about by lifting it, opening it, and stirring it about so as to allow the liquor to circulate freely through the hair, and carry away the lime and dirt. When this operation has been carried on for some time, the basket is lifted out, and by means of the plug before mentioned the waste liquor is allowed to run off; should the lime and dirt appear not to have been completely removed, the same process must be repeated till it is perfectly cleansed. The hair is then once more well washed in clean water. My informant finds that muriatic acid is not so liable to injure the hair as sulphurous acid, and that at the present prices of these commodities there is considerable economy in using the former, but he states also that any other acid will serve the purpose, which in a diluted state will dissolve and separate the lime without injuring the hair, and as prices vary with places, times, and circumstances, I do not therefore limit myself to the use of muriatic acid, but claim a right to use any other acid (sulphurous acid excepted) by which the same cleansing effects may at any time be as effectually and as cheaply performed.

And having now described the different invented improvements communicated to me, as aforesaid, and the manner in which the same are to be performed, I declare that what I claim as comprehended within my patent as distinct from that of the said William Angus Robertson, is—

First, the making of the felted bodies of hats wholly, or chiefly, or in any considerable proportion of horses' hair, cows' hair, or any of the other sorts of hair included under the general title of cattle-hair.

Second, the improved description of felt which is obtained or
555 manufactured by employing the different improved processes hereinbefore described, in conjunction with such of the processes specified by the said William Angus Robertson, as the said improved processes have not superseded, that is to say, the planking, by means of rollers with endless webs or bands passed round them; the brushes with circular movements, worked by and forming part of the machinery as aforesaid; and in certain cases, the close steaming by means of the hollow cylinder, represented in figure 1 of the drawings hereunto annexed.

And third, the cleansing of all descriptions of cattle-hair, by means of muriatic, or any other suitable acid, excepting only sulphurous acid.

And such are the invented improvements communicated to me as aforesaid, being, to the best of my knowledge and belief, new and never before used within that part of her Majesty's United Kingdom of Great Britain and Ireland called England, her dominion of Wales, and town of Berwick-upon-Tweed, and also in all her Majesty's colonies and plantations abroad, I do hereby declare this to be my specification of the same, and that I do verily believe that this my said specification doth comply in all respects fully and without reserve or disguise with the proviso in the said in part recited letters patent contained, wherefore I hereby claim to maintain exclusive right and privilege to my said invention.

In witness whereof, I, the said William Ponsford, have hereunto set my hand and seal, this eleventh day of July, in the year of our Lord one thousand eight hundred and thirty-nine.

WILLIAM [L. S.] PONSFORD.

And be it remembered, that on the eleventh day of July, in the year of our Lord 1839, the aforesaid William Ponsford came before our said lady the Queen in her chancery, and acknowledged the specification aforesaid, and all and everything therein contained and specified, in form above written. And also the specification aforesaid was stamped according to the tenor of the statute made for that purpose.

Enrolled the twelfth day of July, in the year of our Lord one thousand eight hundred and thirty-nine.

RUSSELL.

556

557 No. 8646. A. D. 1840.

Manufacture of woolen fabrics.—Williams' specification.

To all whom these presents shall come, I, Thomas Robinson Williams, of Cheapside, in the city of London, gentleman, send greeting:

Whereas, her present most excellent Majesty Queen Victoria, by her royal letters under the great seal of Great Britain, bearing date at Westminster, the twenty-fourth day of September, in the fourth year of her reign, did, for herself, her heirs, and successors, give and grant unto me, the said Thomas Robinson Williams, her especial license, full power, sole privilege and authority, that I, the said Thomas Robinson Williams, my executors, administrators, and assigns, and such others as I, the said Thomas Robinson Williams, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times during the term of years therein mentioned, should and lawfully might make, use, exercise, and vend, within all her Majesty's colonies and plantations abroad, and in the islands of Jersey, Guernsey, Alderney, Sark, and Man, my invention of "improvements in the manufacture of woolen fabrics, or fabrics of which wools, furs, or hairs are the principal components as well as for the machinery used therein;" in which said letters patent is contained a proviso, obliging me the said Thomas Robinson Williams, by an instrument in writing under my hand and

seal, particularly to describe and ascertain the nature of my said invention, and in what manner the same is to be performed, and to cause the same to be inrolled in her Majesty's high court of chancery, within six calendar months next and immediately after the date of the said in part recited letters patent, as in and by the same, reference being thereunto had, will more fully and at large appear.

Now know ye that, in compliance with the said proviso, I, the said Thomas Robinson Williams, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, is particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon (that is to say:)

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My invention of "improvements in the manufacture of woollen fabrics, or fabrics of which wools, furs, or hairs are the principal components, as well as for the machinery used therein," relates chiefly to the making of cloth by felting alone, without spinning and weaving, and consists in a new combination of machinery, apparatus, and processes, first, for obtaining a long, even, and uniform bat of wool or other materials of any required length, width, or thickness, suitable to be made into commercial ends or pieces of cloth, and afterwards for the purpose of producing such fabrics, or ends, or pieces of cloth, composed of all the various well-known felting substances, such as wools, furs, and the hairs of animals, and which I use either separately or mixed up together, in every possible proportion, and sometimes with a small addition of non-felting fibrous materials, such as cotton, silk, or flax, not exceeding one-third, as best suits the description of fabric required. The fabric or manufacture as produced by these processes and machinery, herein first combined and described, wholly depend for their union and strength upon the great principle or tendency of these animal products, when properly treated, to combine and unite (or as it is commonly called to felt) together, and this without the usual auxiliaries of spinning and weaving, (as in the old cloth manufacture,) or the use of any adhesive mixtures being at all employed. The raising machine I have hereafter described to be used in the finishing of cloths is applicable chiefly to cloth, made by felting alone, but it is also applicable to cloths produced by spinning and weaving. I should first observe, that in the new manufacture of felted cloth I dispense entirely with the use of any oil or oleaginous matter which is generally required in the common woolen manufacture for assisting the spinning of yarns, and prefer that the wool should be well scoured and dried, after which it should be teazed or willied, picked and scribbled in the usual way. The dry, clean wool, as it is thus prepared, is then to be weighed out into quantities for producing any required thickness and width of goods as now described, remarking, that for fine wools I prefer, for obtaining the bat, the method represented at figures 1, and figs. 6, 7, 8, 9, 10, and 11; and for short, coarse wool and hair the method afterwards described under figs. 12, 13, 14, and 15.

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Fig. 1 represents a common wool-carding engine, which, to produce broadcloths, should be made from seventy-two to eighty-four inches

broad; and A, B, C, D, two long revolving aprons of linen cloth (or any other suitable material) attached thereto, passing over the rollers or drums 1, 2, 3, 4, which have a motion from the doffers of the card as here represented, or any other convenient part of the engine. These aprons and drums revolve in opposite directions, as represented by the arrows, so that the two inner surfaces, *a*, *b*, of each apron move in the same direction with uniform speed, and nearly with the same velocity with the doffer of the card, as regards their surfaces. The wool is taken off from the doffers by the usual comb-crank motion in an attenuated sliver. This sliver is now received between the two revolving aprons at *c*, *d*, which have a slight flooring, *i*, *i*, for their support, and passes on between them until it arrives at the further end of the aprons from the card. A direction is then given to the sliver, so that it shall pass up and over the upper apron A, C, and wind itself upon this apron, one sliver over the other, until the bat has become of sufficient thickness, it being during this operation supported and sustained in contact with the apron, A, C, by the apron, B, D, for which support this latter apron is principally intended. As the apron A, C, may be of any determinate length and width corresponding with the card, it is evident that any fixed quantity of wool, being passed through the engine and received upon this apron, may be made to produce any required thickness of bat, and consequently any required weight of goods per yard that may be desirable, after having undergone the succeeding operations. As in many manufacturing premises these two long extended aprons could not be so conveniently used for want of room, I sometimes extend them backwards and forwards, and even with several aprons, as shown at figs. 6, 7, and 8, or perpendicularly up and down, where only two are required, as shown at figures 9 and 10. There is another mode of producing a bat, which, perhaps, on some accounts, is preferable for the finer and lighter descrip-
560 tions of goods. It is still produced from successive folds of the sliver, but in this way there are several slivers taken off from the doffers of different carding-engines and simultaneously received upon the same aprons, and enter into the composition of one and the same bat. For this purpose any of the several arrangements of aprons found most convenient for adaptation to certain premises may be equally applied, it only being necessary to extend the lower aprons of any of these along and under two, three, or more carding-engines, one standing behind or after the other, as shown at fig. 11. The lower apron is here seen extending under the cylinders and doffers of three carding-engines, reaching from A to B. Under each of these carding-engines is a flooring, 1, 2, for preventing the dirt and dust of each from falling upon the bat; but between each carding-engine there is a transverse opening through the flooring for allowing the slivers to fall upon the apron, which, as in the other cases, (with the one sliver,) are carried forward to the lower end of the apron frame, as before described, for winding the bat upon the roller E; and which bat is afterwards treated in a similar way to all or any of those produced in the other machines. It is necessary that these aprons should be prevented from wrinkling, and kept uniformly and carefully extended throughout their whole lengths, whether passed out at length, as in fig. 1, or wound in other

directions, as shown at figs. 6, 7, 8, 9, and 10. I make use of the following means for effecting this object: Upon the two edges of the apron *a*, *a*, *a*, figs. 6, 7, 8, is sown cords *b*, *b*, or strips of leather or any other material, and against these cords or strips the longitudinal guides or strips of wood *c*, *c*, *c*, are brought in contact by means of the forked arms *d*, *d*, and set screws *e*, *e*, thereby preventing the apron from contracting. Fig. 17 represents a detached end view on an enlarged scale of a portion of the apron, with this contrivance applied. Another plan for effecting this object is shown at fig. 18. The apron *a* is here kept distended by means of friction-rollers *c*, *c*, working against the cords or strips of leather *b*. The same effect may be produced by using rods or laths of wood, whalebone, or other suitable material, put at proper distances across the apron; but I have found the other methods answer much better. The bat having acquired its requisite thickness, it is then cut across
561 its width, as represented at *g*, figs. 1, 6, 7, 9, and the end being passed over the roller E, it is wound firmly upon it by contact of the roller with the apron A. When the last end of the severed bat reaches the roller E it brings with it the sliver, which is continuing to proceed from the carding-engine; and which sliver is, as before, passed up over the apron A, C, and another bat is thus then commenced. The bringing off a sliver from the carding-engine and winding it round a roller in folds is now practiced for the purpose of taking the contents of such roller from the scribbler to the carding-machine for making rolls for spinning; and such contents may be and have, I believe, been felted into sheets of very limited size by hand; and occasionally also one piece of bat may have been joined on to another and felted together by manual labor. The continuous bat having been obtained, as before described, and received upon the said roller E, it is then taken to another machine, represented at figs. 2 and 3, called the hardening machine, and placed in the situation marked *f*, *f*. A, B, is the framework of this machine. 1, 2, 3, 4, 5, 6, 7, 8, etc., are rollers, of which there are two sets, one over the other. These rollers are wrapped round with an elastic cloth, and the lower set are furnished with a traveling apron, as represented at *a*, *b*. There are several steam-pipes, connected with a boiler producing steam, brought up and inserted between some of the lower rollers and under the apron represented at *c*, *c*, *c*, which pipes extend from side to side of the apron, and are finely perforated upon their upper sides for the purpose of allowing steam to escape upwards for moistening and warming the bat of wool. As the first stage of the felting process called hardening is now commencing, the upper tier of hardening rollers receive an alternating motion endwise, by a cranked shaft S running along the side of the machine, fig. 3, upon which there are as many cranks or eccentrics having a short throw of about half an inch, and connected with each upper roller by shackle bars or slide rods *n*, *n*. The hardening rollers receive also a slow progressive motion from the main shaft T on the other side of the machine by suitable gearing, consequently moving the apron between the rollers in the direction of the arrows. There is likewise inserted between these rollers and under the apron
562 several heaters, *h*, *h*, *h*, *h*. These heaters are of hollow metal

and connected by stop-cocks with the steam-pipes which furnish the perforating pipes, for the purpose of increasing and regulating the heat applied to the bat and assisting the incipient process of felting. As before stated, the roller E with its bat, being brought from fig. 1, is placed in the position of *f*, *f*, fig 2, and its end being entered between the front rollers of the hardening machine at *x*, it is gradually passed through them, and by means of the alternating motion of the upper rollers acting against the resistance offered by the lower ones, (which do not alternate,) and aided by the moisture and heat, the bat arrives at the other end of the machine in a consolidated firm state, possessing a considerable degree of feltation. Here, at *z*, it is again wound upon a roller F by friction of contact with the apron *a*, *b*, and when the whole bat intended for a piece of cloth (in commerce called an end) is finished and wound upon it, it is taken away to receive the next operation. If this travelling apron be merely wetted by a perforated watering pipe, or by passing into a trough of water under the machine, the heaters *h*, *h*, *h*, acting upon the moisture of the apron so wetted will render (in some cases) the steam-pipes unnecessary, but the heaters must then be increased in number, so as to give nearly one heater to every pair of rollers.

Having now described the machinery and apparatus which I prefer for manufacturing fine wools and furs into the hardened state of the bat, it will be better, before proceeding to the after operation of felting them into cloths, to describe such apparatus as is more adapted to manufacture coarse, short wools or hairs or mixtures thereof into useful fabrics. Figs. 12, 13, 14. A, the feeding end of the machine, and the cylinder B are nearly the common construction of the most improved ordinary devil; the feed-rollers and apron being actuated in the usual way, and the cylinder nearly resembling it, except that I prefer having a greater number of steel teeth, amounting to about twenty-four thousand in a cylinder, six feet wide upon the face and three feet diameter. One important feature, however, in which it differs is that there is no grating to be used under this cylinder, but a large opening or box with an end or stop at *a* is provided for catching or retaining all the unopened locks of material or extraneous matter which fall by gravity into it; and that the
563 draught of air produced by the revolution of the cylinder B will only carry forward such light particles as are completely free, and almost as open as the carding of such materials would produce. C is a cylinder of large dimensions, say three feet in diameter, covered around its circumference with woven wire gauze, or perforated metal supported in one or two parts of its length by thin rims of metal extending to its axle or arbor; the ends of this cylinder are closed, and the ends are just contained within the said linings of this part of the machine, which are the same distance apart as where it inclosed the ends of the cylinder B. It will be seen by the drawing that only the upper half of the cylinder C is exposed to the draught of the toothed cylinder B, and receives the fibres of wool or other materials upon it, and that the lower half is open for the escape of the air through the floor into the room D below, which is constructed of lattice-work or any open material. The surface of the perfo-

rated cylinder C is made to revolve, as shown in the drawings, in the direction of the arrow, at the rate of about five or six feet per minute, and the flow of the material having formed a bat of sufficient thickness, (which is governed by the amount of feed weighed and spread upon the apron *b*;) when the bat has arrived at the two fluted rollers *c*, *c*, (the upper one being weighted upon the lower) it is received between them and passed onwards between the two other endless aprons *d*, *d*, *d*. These aprons are made of strong canvas, and the lower one revolves around the two end rollers 1 and 8, and, consequently, over the intermediate ones 2, 3, 4, 5, 6, 7, and the upper apron passes under the two rollers *z*, *z*, and up over the friction-rollers *g*, *g*. The lower rollers marked 5, 6, 7, are inclosed by the pan *q*, for the purpose of admitting steam to the bat whilst between the two aprons, and for which purpose it is connected by a steam-cock and pipe in communication with the boiler; *e*, *e*, *e*, *e*, *e*, *e*, are upright wooden beaters with smooth rounded ends at bottom, supported in the frame-work *f*, *f*, and directly over the lower rollers, Nos. 2 to 7. These beaters are divided into six or more several parts as they extend across the machine, making in all about thirty-six. They receive a small but quick perpendicular and falling motion by the tappet-shafts *h*, *h*, *h*, *h*, *h*, *h*, which are geared and revolve together, being
564 connected with any convenient part of the machine whereby to be set in motion. The quick alternating action of these beaters, aided by this steam and heat, applied in the way to the bat, occasion it to be properly hardened and united for produc ng a consolidated and partly felted sheet, suitable for the succeeding operation of tight felting, in common with the bats produced by the previous described machines for fine wools by carding.

Fig. 15 is another arrangement of a machine, which is used with advantage in manufacturing the coarser descriptions of goods, such as paddings, coarse druggets, &c., and is in every way similar to that last described, except in the mode employed for hardening the bat, which is likewise performed at one operation, and to both of which the method hereafter described of winding the bat upon rollers with an intervening cloth between the folds is particularly applicable as well as for the greater quantity of these goods, which may be hereby produced in a given time, than in the finer descriptions where carding-engines are altogether indispensable, as before stated; the operation of the machine is precisely similar to the last described until the bat is formed and has arrived at and passed through the delivering rollers *c*, *c*; it is now received upon the endless apron *a*, and passes in between the cylinder Z and the hardening rollers 1, 2, 3, 4, &c., placed around the periphery of the cylinder. This cylinder is hollow, and is best made of thin copper and as light as it conveniently can, being provided with a stuffing-box, and pipes at each end for enabling low steam to be passed in at one end and for the condensed water to be taken off at the other (very similar to a common paper-drying cylinder,) and received its motion from the lower delivering roller *c* The hardening rollers all receive their motion either by a band passed over them and connected with any convenient part of the machine, or have toothed wheels upon their ends

taking into a large wheel upon the axis of the copper cylinder; and it is necessary that the inner surfaces of these rollers should turn in the same direction as the surface of the cylinder and with exactly a similar velocity, and that both the cylinder and rollers should be covered with an elastic cloth. And I may here state that, in all the machines where hardening rollers are employed, I have found it best to cover them first with a piece of good strong
565 felted cloth, having over it another covering of linen cloth, or what I have found very good for this purpose is thick, strong fustian with the pile placed upon the outside. A quick alternating motion of about half an inch stroke is given to the cylinder *z* by an eccentric upon a side shaft, similar to that represented at fig. 3 of the hardening machine, and connected with the main axle of the devil cylinder by bevil wheels; *y* is a perforated pipe connected with a reservoir of water for supplying moisture to the covering upon the cylinder *z* before the bat comes in contact with it at *x;* as the bat is liberated from either of the two last-described machines it is wound upon a roller E by friction of contact precisely in the manner before mentioned in the previous machines. Figs. 19, 20, is what may be now denominated an improved felting machine; A, B, is the frame and supporting parts of the machine, having a double tier of rollers, (now generally made of cast iron,) the upper tiers resting between the lower ones so as to double the points of contact. The undulating motion, and the backward and forward motion produced on the bat in the manner hereinafter described with this new position of the rollers, materially assist the felting process. These rollers are all actuated by bevil gear upon alternate ends of the upper tier of rollers, which turn the lower ones by spur-wheels upon their opposite ends connected with similar gear upon the two shafts extending the whole length of the machine on each side; and these two side shafts are again connected with each other by similar but stronger gear upon the cross main shaft C. Each set of upper rollers should be weighted upon the lower ones for the purpose of accommodating a certain degree of pressure to all the different degrees of thickness or accumulated thicknesses of various goods submitted to their action; D, D, is a box or cistern lined with lead for holding a supply of hot water or soap-suds, and in which the lower rollers can be more or less immersed by regulating the quantity thereof. In the felting of fibres together with the fabrics being felted is not held together by threads; acids or acidulated waters have always been used, because they assist the process; but I use a solution of soap or other saponaceous matter in contradistinction and preferable to acids or acidulated waters, which
566 solution is kept in a heated state as aftermentioned. There are disadvantages attending the use of acids which are avoided by the application of a soapy solution in lieu thereof. Upon the bottom of this cistern there are several coils of metal pipe perforated in many places and connected by a stop-cock with the boiler for heating its contents. R, R, R, are friction-rollers or drums, over which an upper and a lower endless apron *d, d, d,* are passed for conducting the bat or cloth from end to end and through the machine. These aprons of cloth move by the friction of the metal rollers in the direction of the

arrows, and, as will be seen by the drawing, both pass in together between the front rollers *c*, *c*, receiving the cloth between themselves, and liberating it as it arrives at the lower end, one apron, of course, turning upwards and the other downwards. The object of the apparatus, connected with the main shaft *c*, is to give the two tiers of rollers a reciprocating or backward and forward motion, and at the same time to allow the bat, (or as it may now be called the cloth,) alternately pressed and liberated between their inner surfaces, gradually to move in a forward direction through the machine, enabling the rollers to do much more work upon the piece of cloth, without its re-entering at *c*, *c*; G is a pulley, receiving its motion from any convenient part of the running gear with proper speed; *e* is a stud and pin, working a connecting rod attached to the lever *f*, *f*, this lever being loose upon the main shaft at C; *g* is a large-toothed wheel, which is made fast to the shaft C, and seen behind the lever *f*; *h* is a small pinion likewise behind the lever, taking into the larger toothed wheel *g*. Upon the front of this lever, (but working through it and attached by an arbor or axle to the small pinion *h*,) is the toothed wheel *i*, *i*, working into another, or small-toothed wheel *m*, *m*, which is loose upon the main shaft, and to the front of which a fast pulley *x x*, is screwed. Now, it is evident if this last pulley and wheel were to be fastened to any adjoining part of the machine or other thing, and the main shaft only to turn within them, a mere reciprocating motion would be given to the felting rollers of the machine, without their progressing or moving the cloth at all forward. To effect this progressive motion of the cloth, a small pulley *n* is fastened to the pulley G, having a band *o*, *o*, passed over it and around the
567 pulley *x*, *x*, which, notwithstanding the constantly reciprocating motion, is adding thereto a progressive one as well, in order to carry the cloth through the machine as to cause it to receive a regular action from end to end. In order to increase the felting action, it is very desirable to allow the felting rollers to act upon the cloth in as many directions as possible. By the reciprocating motion of this machine, we have seen that this action is produced in each direction longitudinally; and in order to do this in other directions, the cloth is taken from the last machine, and placed in the entering end of another similar felting machine; but instead of being entered as before, the piece is first passed between two feeding rollers T, one of which is shown in fig. 20, and which are placed at an angle with the feeding apron of somewhere near forty-five degrees. These two rollers have a velocity from three to four times that of the feeding-apron upon which the cloth is thrown in regular folds as it enters, laying at nearly the same angle as the position of the rollers. This now causes the action to take place diagonally across the piece of cloth; and after having passed through in this direction it is reversed, and when again passed, it will be seen that the action is nearly at right angles with the last. In this way it may now be run through this machine several times, and for some descriptions of cloth should be for a time milled in the common clothier's fulling stocks; and after having been milled in such stocks, I have found that the cloth may again with advantage be passed through the said felting machine, figs. 19, 20.

It now remains for me to describe another method and process which I use for some descriptions of goods of felting materials, and which may be used either without the aid of the felting-machine or even, indeed, without the hardening-machine; but I prefer passing the bat first through the hardening-machine, as at figs. 2, 3, where the bat is winding upon the roller F; another roller is placed at *x*, as shown in the detached view, fig. 21, having wound upon it a piece of smooth linen, cotton, or worsted cloth, being a yard or two longer than the intended bat of felting material, and being previously wetted with a solution of soap. This is for the purpose of being wound, as there shewn, between the folds of the bat of felting material,
568 which is firmly and tightly effected by weights *a*, *b*, placed on the ends of the roller F. When this is done, the roller upon which it has been wound is withdrawn, when the bat may immediately be put into a broad fulling stock, as broad as the roller is wide, or otherwise suitably placed to receive repeated blows or pressure, or both, where either one, two, or more feet or hammers may be made to act upon or compress it in different directions, and it may be thus worked until it is sufficiently hardened or felted to be unwound and taken out of the cloth, and the felting process is then completed in the common stocks. With respect to the after finishing of many descriptions of these manufactured goods, I will state that they may readily be subjected to all the different processes of raising, shearing or cropping, boiling, pressing, etc., used by manufacturers on the old system of spinning and weaving; but I would recommend the following described machine for raising the pile or nap for the finer qualities of felted goods.

In the drawings, figures 22 and 23, B, C, represents the frame of a new raising-machine; D, E, are two cylinders covered with wire cards or teasels, (but I prefer the wire cards;) these may either be filletting or sheet cards; the teeth should be fine and long, of iron or hard drawn brass wire, not very much bent, but set in good firm leather or Indian-rubber backs; F, G, are two other smaller cylinders, likewise covered with similar card-teeth, to the arbor or shaft of one of which the driving pulley is attached at one end, and by connecting wheels this is made to actuate the other smaller cylinders. These cylinders separately are geared into the two larger raising cylinders by toothed wheels so arranged that the surfaces of the smaller ones revolve somewhat faster than the larger ones, and are for the purpose of clearing the larger ones from the flock which would otherwise collect, as it now does, in the teeth of the present raising-machines, whether of cards or teasels. These two cylinders are placed in slight contact with each other, and the teeth being set in different directions as their surfaces pass each other, (like the fly or fancy of a carding-engine,) it will be readily seen that in neither of them can the flocks accumulate, and that the smaller has a very useful tendency to sharpen the larger or raising cylinders. 1, 2, 3, 4, are nearly the com-
569 mon arrangement of the regulating rollers for conducting and taking away the cloth as it is subjected to the action of the raising cylinders, and receive their motion from the carrying shaft in any of the usual modes. H is the scray or trough into which the

cloth falls as it revolves over the several cylinders, having the ends of one or more pieces secured together so as to form an endless band in its revolution. 5 is a perforated water-pipe for supplying a spray of water to the cloth under action, as it is similarly used in the common gig. The principal feature in this machine, besides the clearing rollers, it will be seen, is the diagonal position of the raising cylinders, one acting from one of the lists toward the other, and the other in the opposite direction. This I have found to produce the closest pile or nap with the soundest and more even bottom, as well as, of course, the best ultimate finish.

Now, having thus fully described the whole process of making felted cloths by my improved machinery, I wish it to be understood that I do not claim as my present invention any individual parts of the same, but I claim the application of a double apron or aprons, or compound aprons and rollers or cylinders, for the production of bats, as herein described, from the long sliver, and the different means herein described for keeping these aprons together with the bats in a smooth and even condition; and I claim the extended sliver itself, as herein described, applied to forming a bat by successive folds or layers, for the production of long or commercial ends of cloth without spinning or weaving.

I also claim the improvement of the hardening machines, figures 2, 3, 12, 13, 14, 15, by using the heaters in addition to steam pipes or pans, or in conjunction with a wetted apron, as hereinbefore mentioned, and using traveling aprons, as hereinbefore described.

Also I claim the improved positions of the rollers in the felting machine, figures 19 and 20, for producing the double contact of each tier of rollers, and the combined reciprocating and progressing motion of these rollers, as well as the manner in which this motion is produced, as applied to the said felting-machine; and also the method of diagonal or cross felting as effected by the feeding-rollers, fig. 20, hereinbefore described; and also the method described at fig. 21 of producing long continuous fabrics of felt in a fit state for the common fulling stocks.

570 I also claim in the raising machine, figures 22 and 23, the diagonal positions of the raising cylinders, as hereinbefore described, and particularly also the use of other or opposite revolving cylinders, whether covered with cards or any other material, for clearing raising cylinders whilst at work, as applied to the cloth manufactured by felting alone, or by the old method of spinning and weaving.

I also claim the use of soap or saponacious matters dissolved in water, in conjunction with rollers, for assisting in the felting of fabrics made without spinning and weaving, in contradistinction to acids or acidulated waters which have heretofore been used for fabrics, depending for their union upon felting alone.

In witness whereof, I, the said Thomas Robinson Williams, have hereunto set my hand and seal this eighteenth day of March, in the year of our Lord one thousand eight hundred and forty-one.

THOS. R. WILLIAMS. [L. S.]

And be it remembered that on the eighteenth day of March, in the fourth year of the reign of her Majesty Queen Victoria, the said Thomas Robinson Williams came before our said lady the Queen in her chancery, and acknowledged the instrument aforesaid, and all and everything therein contained and specified, in form above written. And also the instrument aforesaid was stamped according to the tenor of the statute made in the fifty-fifth year of the reign of his late Majesty King George the Third.

Inrolled the twentieth day of March, one thousand eight hundred and forty-one.

Dowdeswell.

The United States Patent Office to all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the files of this office of the statement filed in the matter of the application of Alva B. Taylor and Henry A. Burr for the extension of letters patent for "improvement in machinery for forming hat-bodies," granted to said Taylor and Burr, February 9th, 1847.

In testimony whereof, I, S. T. Shugert, Acting Commissioner of Patents have caused the seal of the Patent Office to be hereunto affixed this fifteenth day of March, in the year of our Lord one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-fifth.

[L. S.]

S. T. SHUGERT.

To the Hon. Commissioner of Patents:

In the matter of the application of Alva B. Taylor and Henry A. Burr for the extension of letters patent granted to them on the ninth day of February, 1847, for improvements in machinery for forming hat-bodies—

We, the applicants in the above-entitled matter, respectfully submit to the honorable Commissioner of Patents the following statement of the origin, progress, and reduction to practice, of our said invention, of the extent to which it has been, and is now used, of the ascertained utility and value thereof to the public, of the ingenuity, time, labor, and expense bestowed on the said invention, and the introduction thereof into public use, and of the amounts received by each of us from the use and sale thereof.

In the year 1846 we were both, jointly with Charles St. John, interested by purchase in a portion of the right to an invention of Henry A. Wells, for forming hat-bodies, secured by letters patent granted to him, and bearing date the twenty-fifth day of April, 1846. That invention called for an entire change in the art of manufacturing fur hat-bodies, and in that, as in all inventions intended to induce a radical change in any branch of the useful arts, innumerable difficulties were experienced in the introduction of it into public use, not only from the opposition of the trade to the introduction of this new system, but from the practical working of the machine, incident to the introduction into practice of a new invention.

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In the machine invented and patented by the said Wells, the varying thickness of the hat-body from brim to tip is effected by a hinged deflector, termed in the patent a "hood," placed at the upper end of the delivery-aperture of what is termed the trunk, which hood was to be operated either by the hand of an operative to vary the deposit of the fur fibres on the pervious cone or former on which the hat-body is made, which hood, however, may be operated automatically by the machine. The deposit of the fur fibres is also regulated by another hinged deflector or flap placed at the lower part of the delivery-aperture of the trunk, which flap is adjustible by hand.

The Wells machine with these appendages, although valuable and efficient for the purpose intended, nevertheless presented one difficulty in view of the condition of the trade.

Hats are required to be made of varying thickness from brim to tip, and different kinds of hats require a variation in the relative proportions of the thickness from brim to tip, and these relations are required to be changed not only by fashion but by the taste and peculiar notions of different hatters. Some require the brim and band to be much thicker, relatively to the crown and tip, than others, and the manufacturer who makes the bodies for the hatters, who finish them, must be able to suit all these different and constantly varying demands.

On the Wells machine it was found that this could only be done efficiently to the satisfaction of the trade by operating the deflector by hand, and to do it required skill and judgment in the operative, which could only be acquired by long practice, so that it was difficult and expensive; and however skillful the operative, it was next to impossible to make all the bats, of any given lot, of uniform varying thickness

573 And there was still another difficulty. It is important, in making many kinds of hats, that the tip and crown should be thin, and that part of the body which is to form the angle at the junction of the tip and crown should be thick, to give the required strength and durability to that part of the hat which is next to the brim, the most exposed to wear and fracture. On the Wells mahine, whether the hinged deflectors were operated by hand or by machinery, this could not be effected to the satisfaction of the trade.

These objections were much more formidable at the incipiency of the business, when all persons in the trade were making every effort to condemn this innovating method of forming hats, than they would have been if presented after the successful introduction of the invention, *for at first even imaginary defects often defeat the introduction of a useful invention.*

The thing to be accomplished was, in retaining the general mode of operation of the Wells invention, so to improve it that it could be readily set to form bats of any desired varying thickness from brim to tip, without requiring a skillful operator to work it, and which, when set to any desired variation in thickness, would make any number of bats all alike, and which could also be set to give the required extra thickness, not only to the brim and band, but to the

part which forms the angle at the junction of the tip and crown. To accomplish this desideratum many plans were suggested and tried, at great expense to the owners, by the original inventor, Henry A. Wells, and by the machinists employed to construct the machines, but without success. And finally, by mutual suggestion and contrivance, we jointly conceived the idea of our said invention, which consists in making the sides of the trunk, which guides or directs the fur-bearing current to the pervious cone, of sheet-metal, or analogous substance, which could be readily bent to and retain the form desired, and in making the top of this trunk movable, and to embrace the sides, so that it could be set to any elevation desired relatively to the bottom thereof, and to the size of the pervious cone. In this way we were enabled readily to give any form desired to the delivery-aperture of the trunk, and by changing the form and size of this delivery-aperture to vary the deposit of the fur on the various parts of the
574 height of the pervious cone in any proportion desired, so as to make hat-bodies of any varying size and thickness which might be required. The machine, so made, when set to any form, will make any number of hat-bodies, all precisely alike, *as the distribution of the fur fibres on the cone is determined by the form of the delivery-aperture of the trunk.*

This improvement, as soon as tried, was found to accomplish all that was desired, for it not only admitted of setting the machine for any desired variation in the thickness of the hat-body, and of putting the extra thickness at any desired part of the bat, and when set to make any desired number of hat-bodies alike, but it avoided the necessity for the use of an intelligent and skillful operative to work each machine, as the only skill required is in re-setting the form of the delivery aperture whenever a lot of hat-bodies is required to be made of a different varying thickness, and this is done by the foreman or superintendent of the establishment, who is required, for other reasons, to be skillful and judicious.

From the time of the introduction of that improvement the Wells method of forming hat-bodies was a practical success, and the most persistent opponents of this method were finally compelled to yield.

We are enabled to say, after long experience in the working of the Wells machine with and without this our said improvement, that one-fourth of the saving, which has been effected by the Wells method in the manufacture of hat-bodies, has been due to this improvement.

The Wells machines were first started for the business of manufacturing hat-bodies about the early part of the year 1845; and from that time to the first of January, 1846, forty-seven thousand two hundred and thirty hat-bodies were manufactured; and from the first of January, 1846, to the first of January, 1847, the time of the introduction of our said improvement, one hundred and seven thousand two hundred and twenty-two hat-bodies were manufactured.

After having devoted ourselves assiduously during the whole of the year 1846 to the experiments which finally resulted in the successful working of our said improvement, and expended in such experiments not less than $5,000, on or about the first of January, 1847, we
575 applied our said improvement to the Wells machines previ-

ously used, and the result was so satisfactory, that on the same number of machines so improved, we manufactured, from the first of January, 1847, to the first of January, 1848, two hundred and twenty-nine thousand eight hundred and sixty-one hat-bodies; and from that time onward this method of manufacturing hat-bodies progressed so rapidly that in the first eleven months of the present year the number of hat-bodies made by persons authorized to work under the said patents, and irrespective of infringers, is two millions five handred and eleven thousand four hundred and seventy-eight, on about fifty machines.

At the time of making and introducing our said invention we were jointly interested in the H. A. Wells invention and patent, to the extent each of one undivided sixth part of the profits, and we so continued in that proportion until about the first of January, 1849, at which time we purchased the remaining interest for the sum of $3,250, and an agreement to pay to Wells, or his heirs, during the residue of the term of his patent, $1,200 per annum; and from that time after we were interested in the ownership to the extent of one undivided third part of each. And this proportion remained until the second day of May, 1854, at which time numerous infringing machines were started, giving indications of complicated and extensive litigation. From this cause, and misfortune in other business, one of us, Alva B. Taylor, was unable to retain his interest any longer, and thereupon sold out his entire interest in this and the Wells patent, and several other patents relating to improvements in machinery for forming hat-bodies, and in the manufactory which we had started for this business, which sale was effected for the sum of $50,000, and included $11,000 as his share of machinery in the manufactory, leaving $39,000 as the amount received for the patents.

The arrangement or agreement with our co-partners was such that without any consideration, other than being joint owners in the Wells patent, they derived equal advantages with us in the use and sale of our said invention, so that the benefits which we have derived from the use and sale thereof is necessarily included in the profits which we have derived from the use and sale of the Wells patent.

576 A.

From the first of January, 1847, to the first of January, 1849, at which time we jointly, with Charles St. John, became possessed of the whole right, the expenditures exceeded the receipts of all kinds to the amount of $689\frac{13}{100}$, one-sixth of which was sustained and paid by each of us, one-half having been charged to H. A. Wells, and the other sixth to Charles St. John.

B.

From the first day of January, 1849, to the first day of January, 1854, the profits, clear of all expenses, was $105,000, one-third of which passed to each of us, the remaining third having been received by Charles St. John; so that, after deducting the expenditures of all kinds to this time, the whole profit of every kind received by Alva B.

Taylor from the use and sale of the Wells invention, including our said improvement, is $\$24,885\frac{15}{100}$; to which sum must be added the amount received from the sale to Wright and Riblet, $50,000, making a total of $\$74,885\frac{15}{100}$.

On the assumption that one-fourth of the saving which has been effected by the Wells method is due to our said invention, and that it should be credited with one-fourth of the profits actually made from the whole business, then the amount of profits received by A. B. Taylor, as his share, for the use and sale of our said invention, is $18,721 28.

The profits derived from the business by Henry A. Burr, up to the time of the sale of A. B. Taylor to Wright and Riblet, are precisely the same as the profits above specified as having been received by Taylor, but beyond that period they require to be separately stated.

From the first of January, 1854, to the thirteenth day of October, 1856, the net profits derived in every way from the use and sale of the Wells invention and our said improvement amounted to $142,650, after deducting the expenditures in like manner as we have done above, in stating the profits up to the time of A. B. Taylor's sale to Wright and Riblet.

Of this amount one-third was credited to H. A. Burr, being $47,555; the other two-thirds to St. John, Wright, and Riblet.

On the thirteenth day of October, 1856, Henry A. Burr pur-
577 chased from Charles St. John all his right in the business, and in the Wells and the other patents, including our said patent, and paid therefor the sum of $47,201 31.

The net profits of the whole business from the thirteenth day of October, 1856—the time of St. John's sale—to December first, 1860, after deducting expenses as before, amount to $144,714, two-thirds of which *passed to the credit of Henry A. Burr*, being $96,476.

From which is to be deducted the amount paid by H. A. Burr for the one-third interest purchased from Chas. St. John, $47,201 31.

Leaving as balance of profits for that period $49,275 79; so that the profits received by Henry A. Burr, from the time of completing our said invention to the present time, from the Wells invention, including our said improvement, amount in the aggregate to $111,695 94.

And on the assumption that our said invention is to be credited with one-fourth of all the profits, H. A. Burr's profits, by reason of the use and sale of our said invention, amounts to $27,923 98.

During the year 1846 we expended in experiments on our said invention, *and in taking out the letters patent*, as before stated, in all $5,000, one-half of which should be deducted from the profits received by H. A. Burr, leaving a balance in his favor of $25,423 98.

And the other half to be deducted from the profits received by A. B. Taylor, leaving a balance in his favor of $16,221 28.

The accounts of the business were kept carefully and accurately. They include every item which was in any manner received from the manufacture of hat-bodies, the invention being used for no other purpose, from the sale of licenses, license fees paid by licensees on every hat-body made, and accounts received for the sale of machines. And these include all the sources of profit of the joint owners of the

patents. And from the amount thus received from all sources, we have deducted the expenses of constructing machines, of working them to the extent that we manufactured hat-bodies, and the legal expenses arising out of the infringement of the patents. To furnish a full and specific account of all the items would be too voluminous; and we are advised by our counsel that it is unnecessary, as parties opposing the prayer of our application can refer to the books, which will be opened to their inspection, if there should be any desire to verify this our said account.

578

As to the value of the said invention to the public:

The number of hat-bodies made on the Wells method, including our said improvement, from the first of January, 1847, when it was first applied, to the present time, is not less than 43,788,719. The price for which hat-bodies have been and are now manufactured for the trade by those who work on the plan of Wells's patent with our improvement is, on an average, twenty-nine cents per hat-body—less than the price for which they were then or can now be made by hand—so that the actual saving to the public by the Wells method, in connection with our said improvement, has been not less than $12,698,728, making the saving due to our said invention not less than $3,174,682, during a little less than fourteen years, and irrespective of the benefits derived by the public by the use thereof by infringers.

A. B. TAYLOR.
H. A. BURR.

Sworn before me December 22d, 1860.

D. B. TAYLOR,
Commissioner of Deeds.

State of New York, city and county of New York.

Honorable Commissioner of Patents:

SIR: On the 3d inst. I sent to the department the application of Messrs. Burr and Taylor for the extension of their patent, dated February 9th, 1847, for making hat-bodies; but the patent, which was forwarded at the same time, had not the drawings attached. I now inclose them, and request that they may be attached to the patent.

I remain, sir, yours, respectfully,

C. M. KELLER,
By WM. H. BISHOP.

NEW YORK, *November 1st*, 1860.

579 *Honorable Commissioner of Patents:*

SIR: I have the honor to inclose herewith the petition, and certificate for the fee of forty dollars, in the matter of the application of Henry A. Burr and Alva B. Taylor, for the extension of their patent, dated

February 9th, 1847, for improvements in machinery for manufacturing hat-bodies.

The old patent is also inclosed.

I remain, sir, yours, respectfully,

CHAS. M. KELLER,
By WM. H. BISHOP.

NEW YORK, *November 3d*, 1860.

To the honorable Commissioner of Patents:

The petition of Henry A. Burr, of the city, county, and State of New York, and Alva B. Taylor, of Newark, in the county of Essex, and State of New Jersey, respectfully represents:

That letters patent of the United States were granted to them on the ninth day of February, 1847, for certain new and useful improvements in machinery for manufacturing hat-bodies, and that said letters patent will expire on the ninth day of February, 1861. That since the date of the patent they have used due diligence in introducing the said invention into public use, and that, without neglect or fault on their part, they have failed to obtain from the use and sale of their invention a reasonable remuneration for the time, ingenuity, and expense bestowed upon the same, and the introduction thereof into use. They therefore pray that the said patent may be extended for the further term of seven years from the said ninth day of February, 1861, in accordance with the 18th section of the act of Congress, approved July 4th, 1836, they having paid forty dollars into the treasury of the United States, in conformity with the act of Congress in such case made and provided.

And they hereby authorize Chas. M. Keller to act as their attorney in filing and prosecuting this application for extension before the Patent Office.

ALVA B. TAYLOR.
H. A. BURR.

580 UNITED STATES PATENT OFFICE,
Washington, November 6th, 1860.

On the petition of A. B. Taylor and H. A. Burr, of New York, N. Y., praying for the extension of a patent granted to them for an improvement in machinery for making hat-bodies, for seven years from the expiration of said patent, which takes place on the ninth day of February, 1861—

It is ordered that the said petition be heard at the Patent Office, on Monday, the twenty-eighth day of January next, at 12 o'clock m.; and all persons are notified to appear and show cause, if any they have, why said petition ought not to be granted.

Persons opposing the extension are required to file in the Patent Office their objections, specially set forth in writing, at least twenty days before the day of hearing. All testimony filed by either party, to be used at the said hearing must be taken and transmitted in accordance with the rules of the office, which will be furnished on application.

The testimony in the case will be closed on the fourteeth of Janu-

ary, 1861; depositions and other papers relied upon as testimony must be filed in the office on or before the morning of that day; the arguments, if any, within ten days thereafter.

Ordered, also, that this notice be published in the *Constitution*, Washington, D. C., and New York *Day Book*, New York, N. Y., once a week for three successive weeks, the first of these publications to be at least sixty days previous to the twenty-eighth of January next, the day of hearing.

PHILIP F. THOMAS,
Commissioner of Patents.

P. S.—Editors of the above papers will please copy, and send their bills to the Patent Office with a paper containing this notice.

NEW YORK, *December 8th*, 1860.

Honorable Commissioner of Patents:

SIR: You will please recognize J. N. McIntire, of Washing-
581 ton, D. C., as associate attorney in connection with myself in the matter of any application for extension of letters patent for machines for making hat-bodies, now pending before you.

Yours, respectfully,

CHAS. M. KELLER.

PHILADELPHIA, *December 29th*, 1860.

To Hon. S. T. Shugert, Commissioner of Patents:

SIR: Please enter my name as opposing the extension of Burr and Taylor's patent for hat-body machinery, which expires February 9th, 1861. I represent James Booth and others.

Respectfully, your obedient servant,

GEORGE HARDING.
285 *South Fourth street, Philadelphia.*

To the Commissioner of Patents:

SIR: Please take notice that I shall oppose the extension of the patent granted on the ninth day of February, 1847, to A. B. Taylor and H. A. Burr, of New York, N. Y., for an improvement in machinery for making hat-bodies.

Very respectfully,

GEORGE HARDING,
Of Counsel for James Booth, of Newark, New Jersey.

PHILADELPHIA, PA., *December 29th*, 1860.

582

583 SEPTEMBER 25*th*, 1861.

Harvey Kelley, being sworn in behalf of the defendants, deposes and says as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Harvey Kelley; forty-nine years of age; reside in Newark, and am a hatter by trade.

Q. 2. How long have you been in the hatting business?

A. I suppose twenty-five or thirty years. I served my time at it.

Q. 3. Did you see an experiment tried this morning in the presence of Mr. Treadwell, at the defendants' factory in Newark, in which a trunk was employed on a hat-body machine without a hinged hood?

A. I did.

Q. 4. State what kind of a hat-body said trunk, without a hinged hood, made?

A. Well, it made a very poor one, that I saw.

Cross-examined by Mr. Gifford, counsel for complainant.

X. 5. Who tried the experiment?

A. Well, I don't know what the man's name was that tried it, myself; he was a stranger to me.

X. 6. Do you know whether that man was an experienced man in forming hat-bodies on a machine with a trunk and without a hinged hood?

A. No, I do not; I didn't know the man.

X. 7. How many hat-bodies did he make?

A. Well, I think, three, or four, or five—somewhere along there; I think three or four; I am not positive which.

X. 8. What was the shape of the end of the trunk out of which the fur came; was it shaped like Exhibit 19?

A. Not exactly like that, but something similar to it.

X. 9. Did it have any hinged flap under the delivery end of the trunk, which would raise up and down?

A. Yes, sir.

X. 10. Did that hinged flap work like the one in Exhibit 19?

A. It dropped down and raised up. I didn't notice particularly whether it rested on anything or not.

584 X. 11. What material was the trunk made out of?

A. What kind of wood; I don't know, sir.

X. 12. How many persons were present when the experiment was tried?

A. Well, I think there was six or seven around there; how many more I can't say; as many as that at any rate.

X. 13. Do you know whether there was a proper or an improper quantity of air let into the trunk?

A. I do not—no sir.

X. 14. Do you work at hatting now?

A. I do.

X. 15. For whom?

A. For Moore & Seely Brothers, of Newark.

X. 16. By whom do they have their hat-bodies formed?

A. By Mr. Booth, at present, of Newark.

X. 17. Do you know whether in this experiment the man used a cone or cones of proper size and shape for a trunk, with the delivery end of the trunk the size and shape of the one he used?

A. No, sir, I don't know anything about it. He used the cone such as they generally use, or such as I see them use.

X. 18. Are you not aware that in a hat-forming estblishment they have a large number of different shaped cones?

A. Yes, sir, I am aware of that.

X. 19. And are you also aware that in such an establishment they have a large number of different sized cones?

A. Yes, sir, I am aware of that.

X. 20. Do you know whether or not, in the experiment you speak of, the trunk was set in a proper relation to the cone?

A. Well, I suppose that it was; I expect it was; I don't know for a certainty, but I suppose it was.

X. 21. How did the height of the bottom of the trunk correspond with the height of the bottom of the cone, if you know?

A. Well, the cone was about even with the bottom of the trunk, I suppose.

X. 22. Was the hinged flap spoken of open or shut while the experiment was going on in forming the bat?

A. It was both, sir. Tried it open, and tried it shut.

585 X. 23. How far open did you try it?

A. Well, I should think three or four inches it was down.

Direct resumed.

Q. 24. Was this experiment tried with cones of various size?

A. There was as many sizes as there was hats formed, three or four sizes, I think.

HARVEY KELLY.

Subscribed and sworn to before me this 25th September, 1861.

R. E. STILWELL,
U. S. Commissioner

Samuel Doughty, being called on the part of the defendants, deposes and says as follows, viz:

Q. 1. What is your name, age, residence, and occupation?

A. Samuel Doughty, 35 years of age, reside in Newark, and am a hatter.

Q. 2 How long have you been a hatter?

A. Twenty years.

Q. 3. Did you see an experiment tried with a trunk and without a hinged hood, on a hat-forming machine, at defendants' factory this morning, in the presence of Mr. Treadwell?

A. I saw an experiment with a trunk, in the presence of Mr. Treadwell this morning, at defendants' factory in Newark.

Q. 4. What was the character of the hat-bodies formed or attempted to be formed; were they merchantable or unmerchantable?

A. The bodies that I saw formed were good for nothing.

Q. 5. Who was present?

A. Mr. Treadwell, Mr. Kelly, and several men who were employed on the machine. Owen Burns was the man that run the machine. He is the man that does their forming, I believe. Those are all I remember the names of at present. I know most all their names, but I can't remember them.

586 *Cross-examined by Mr. Gifford, counsel for complainants.*

X. 6. Were there any present that you have not named, except workmen of the defendants?
A. Not that I recollect.
X. 7. Do you work at hatting now
A. I do.
X. 8. For whom?
A. Moore and Seely Brothers.
X. 9. For the same employers that the last witness works for?
A. The same.
X. 10. How came you to witness the experiment this morning?
A. It was through Mr. Jaques.

SAMUEL DOUGHTY.

Subscribed and sworn to before me this 25th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

John W. Seaver, (a witness for defendants,) recalled.

Q. 1. Examine (machine marked Exhibit 28) and state whether or not that machine has been used by the defendants, and if so, since when, in its present condition?
A. Well, it was used in the same condition it is now for about one year, I think.
Q. 2. Prior to the injunction, was any change made in that machine, and if so, in what way? State, if you can, how long prior to the injunction. I mean in reference to the introduction of an air-blast?
A. I don't remember.
Q. 3. Was that machine ever run with an air-blast running from the exhaust and terminating in front of the picker, as shown in model Exhibit A; if so, when was it so run, that is, before or since the injunction?
A. Yes, sir, it was run in that way before the injunction.
Q. 4. When was that machine first run in its present condition?
A. I think it was right away after the injunction.
587 Q. 5. Had it been running in that way at any previous time in its present condition?
(Objected to, as the witness has already answered that he thinks it has been run in its present condition immediately after the injunction.)
A. Yes, sir; I think it had before the injunction, when it was first put up.
Q. 6. How long did it run in that way when it was first put up?
(Objected to for the reason that the witness has not said it was so run, and is not positive about it.)
A. I an't positive, I think about four or five weeks.
Q. 7. Refer to machine marked Exhibit 29, and state whether said machine is one of the defendants' machines?
A. Yes, sir.

Q. 8. Have you a set of step-plates belonging to said machine? if so, produce them, and mark them as exhibits.

A. I have, and I produce them; and they are marked 29 A, 29 B, 29 C, and 29 D.

Q. 9. State whether or not machine Exhibit 28 has been run in its present condition from the injunction down to the present time?

(Objected to as irrelevant.)

A. Yes, sir; I think it has.

Cross-examined by Mr Gifford.

X. 10. Go to the machine Exhibit 28, and look at the curved piece in front of the picker, and state if you know whether the machine has been used from the injunction down to the present time with that piece on it.

A. I think it has the most of the time.

X. 11. Who made the pieces marked 29 A, 29 B, 29 C, and 29 D?

A. Seth Boyden.

X. 12. Has Mr. Boyden been here yesterday and to-day helping you set up the machines Exhibit 28 and Exhibit 29.

A. He has been here to-day; I don't know whether he was here yesterday or not.

588 X. 13. I see the step-piece 29 C is longer than the others; that is, the step part of the plate; why is that?

A. Well, I don't know as I can tell the reason of that.

X. 14. I see that some of the step-pieces are higher than others of them; why is that?

A. Well, I suppose that is to throw the fur on to the tip, that is, by the high ones.

X. 15. Who judges which kind of the step-pieces are to be used in the operation of the machine?

A. I do.

X. 16. When do you take a high one instead of a lower one?

A. When we put on a higher cone.

X. 17. When would you take one having the stepped part as long as 29 C instead of one as short as 29 A.

A. When we take a larger cone.

JOHN W. SEAVER.

Mr. Harding offers in evidence a certified copy of letters patent of Lemuel Lyon, dated February 5, 1847.

Mr. Harding also offers in evidence model representing Lemuel Lyon's specifications, marked No. 30.

589 Samuel Brown, being about the age of twenty-six years, and having been by me first cautioned and sworn to testify the truth, the whole truth, and nothing but the truth, in the matter of controversy aforesaid, I did carefully examine the said Samuel Brown, and he did thereupon depose, testify, and say as follows, viz:

Q. 1. What is your age, residence, and occupation?

A. Twenty-six years of age, reside in Newark, and work at hatting at the present time.

Q. 2. Were you ever employed as teamster for Rankin, Duryee & Co., and their successors in Newark; if yea, when, and for how long?

A. I was employed by them; worked for them from 1855, and have worked for them ever since, but may have been off for a couple of weeks, or a couple of months at a time; I have worked for them as teamster from 1855 for four years.

Q. 3. Did you ever convey any hat-body machines from the factory of Duryee & Co., in Newark, to Burr & Company, in New York; if yea, how many?

A. I did, sir; two.

Q. 4. About what time, the first?

A. Well, it was shortly after I first went to work for them; it might have been a year or so.

Q. 5. How long after that, the second?

A. Could not say exactly, sir; but there was some time between the two machines.

Q. 6. About how long?

A. As near as I can say, I think it might have been eight or ten months, perhaps a year.

Q. 7. Was either of these machines returned?

A. I could not say, sir.

Q. 8. About what time in 1855 did you enter the employ of Duryee & Co.?

A. In June.

Q. 9. Did you carry any machine back in exchange for either one that you carried to Burr & Co.?

A. I took one machine back from Mr. Burr's place to Mr. Jaques'.

Q. 10. Only one?

A. Only one.

590 *Cross-examined by Mr. Bradley, counsel for complainant.*

X. 11. Where did you take the first machine that you carried to Burr & Company's, in New York?

A. To Mr. Burr's factory.

X. 12. Was it when you took the first, or when you took the second, that you took a machine back?

A. I think it was after I took the second.

X. 13. How long after?

A. I couldn't say, exactly.

X. 14. Was it shortly after?

A. I couldn't say, sir; I am not certain.

X. 15. Whereabouts was Burr's factory located to which you took the first machine?

A. Corner of Cliff street.

X. 16. Was it boxed up?

A. Part of it, sir.

X. 17. What part was not boxed?

A. I don't know what part of it they call it; I don't know the name of it.

X. 18. Who was with you when you took the first machine?

A. On the wagon, do you mean, between Newark and New York?
X. 19. Yes?
A. No one.
X. 20. Did any one accompany you to Burr's factory on that day?
A. Not that I remember of.
X. 21. Whom did you see at Burr's factory?
A. The first, I went into the place where they formed the hats. I found a man there whom I asked where he wanted the machine, and he came out and told me to drive around to the other block, around the other side of the building.
X. 22. Did he go with you?
A. No, sir.
X. 23. Did you drive around?
A. Yes, sir.
X. 24. Into what street?
A. Cliff street.
X. 25. Who unloaded the machine?
591 A. I don't know their names. There were two men. They appear to be machinists, from the looks of them.
X. 26. Did you see any one else but those two men at that time?
A. Yes, sir, there came another man at the door.
X. 27. What other man came to the door?
A. I don't know who he was.
X. 28. Could you describe him?
A. He was a pretty stout man, in his shirt-sleeves.
X. 29. Are you speaking of the first time or second that you took a machine there?
A. The first time.
X. 30 How many times were you ever at Burr's factory?
A. I was there about four times, I think; that is, in the building.
X. 31. I said at the building.
A. Do you mean pass by it in the street?
X. 32. How many times did you ever go to Burr's factory with a wagon or other vehicle?
A. Do you mean to go to the factory on business?
X. 33. Yes.
A. About four times.
X. 34. What for on those occasions?
A. I took two machines there—one each time; that is twice. Took one away from there; that is three times. And I went another time to the place where they form their hats, in the same building. It was for fur, or for a sample of a body; I can't tell which now.
X. 35. Did Duryee, Jaques & Co. have any other teamsters at the time you took the first machine to Burr?
A. Yes, sir.
A. 36. How many?
A. One regular teamster.
X. 37. How many when you took the second machine?
A. One besides myself.
X. 38. Who was it in both cases.
A. His name is Thomas Brown.

X. 39. Any connection of yours?

A Yes, he was my father.

592 X. 40. Is he still in the employ of Duryee, Jaques & Co.?

A. Yes, sir.

X. 41. How large a piece of the first machine was not boxed up?

A. Couldn't say how large a piece the largest was that wasn't boxed up.

X. 42. Were there more pieces than one; if so, how many, that were not boxed?

A. There was more than one; but I didn't count them.

X. 43. Were they large pieces, or small pieces?

A. Some were pretty small; some of them were very large.

X. 44. Give some description of the size and appearance of the pieces that were not boxed?

A. Some pieces looked as if they were made for pieces of shafting to run in beam, for pieces of shafting. There were other crooked-looking pieces of iron. I thought they was made to hold up something. I can't remember the particular shape of any other piece.

X. 45. How long was the box which contained what was boxed up?

A. Well, it was a pretty large box, but I couldn't say how large it was.

X. 46. Give some idea.

A. It might have been four or five or six feet one way—I could not tell; we got it on to the wagon—and might have been three foot the other way; I won't be certain, as near as I can think.

X. 47. What room was it taken into?

A. I don't know what they call the room; it was taken into Mr. Burr's place; I can't tell what room; it appeared to be the place where they had their old machines, not where they had their machines running—like where they repaired them; I didn't go in, I only went to the door.

X. 48. Was the second machine that you carried to Burr's factory boxed up or not?

A. Part of it.

X. 49. How long was that box?

A. About the same size as the other.

593 X. 50. What pieces of machinery were not boxed?

A. I did not take particular notice.

X. 51. Were there many pieces not boxed?

A. Not very many.

X. 52. How many?

A. Did not count them; how can I tell how many when I didn't count them?

X. 53. About how many?

A. I might guess at it; I might say there were six, seven, or eight—I can't say for certain, any way.

X. 54. Who took charge of that when it came to Mr. Burr's factory?

A. I don't know their names; they appeared to be the same two men that took charge of the other.

X. 55. Did the same persons come out who gave directions before?

A. No, sir.

X. 56. Did you see any one have to do with this machine at Burr's factory except the two men?

A. Do you mean to unload it and take it in the shop, sir?

X. 57. Question repeated.

A. I don't know what you mean to have to do with it, whether it it is to help take it out of the wagon or not.

X. 58. Did any one else give directions about it?

A. No, sir.

X. 59. Did you see any one else about it?

A. When we got part of it out and got it on the sidewalk, there may have been several about it, passing up and down on the sidewalk.

X. 60. Did no one else but the two men have anything to say about the machine at Burr's factory?

A. Not while I was there that I know of.

X. 61. Did you take any message with the machine?

A. Not that I remember, except that was a machine from Mr. Jaques' place—Jaques and Duryee.

X. 62. Did you take any message with the first machine?

A. No, sir; no more than that it was a machine from Duryee & Jacques' place.

X. 63. Did you assist in boxing up the first machine?

594 A. No, sir.

X. 64. Did you assist in taking it to pieces preparatory to its being loaded?

A. No, sir.

X. 65. Did you see anybody box up the parts that were boxed?

A. No, sir.

X. 66. When you first saw it, was it already boxed ready for the wagon?

A. Yes, sir, when I first saw it after they told me to get ready to load it.

X. 67. Was it marked and directed?

A. I do not think it was, sir.

X. 68. What season of the year was it?

A. I think it was in the summer season.

X. 69. Were both machines taken in the same door on Cliff street?

A. Yes, sir.

X. 70. When did you commence working at hats?

A. As near as I can think, it is near eighteen or twenty months ago.

X. 71. Have you done any teaming since?

A. No, sir.

X. 72. What kind of work do you do on hats?

A. I work at the branch they call pumicing, sir.

X. 73. What is that—can you describe it?

A. Yes, sir; it is before the finisher gets the hat, we rub it with pumice-stone.

X. 74. Did you ever work on a hat-body machine?

A. No, sir.

X. 75. Did you work at teaming until the time you began to work at hats?

A. Yes, sir.

X. 76. How long before you quit the teaming was it that you brought the second machine to Burr's factory?

A. It might have been a year or two years; I can't exactly tell.

X. 77. Which time was it that you saw the stout man in his shirt-sleeves?

595 A. The first time.

X. 78. Did you ever see him on any other occasion; if so, when?

A. Not that I know of; I might have seen him and not known him.

X. 79. While you were teaming, how often did you come to New York with a team?

A. Every day, mostly.

X. 80. What do you bring?

A. Hat-cases.

X. 81. Where did you take them?

A. To Mr. Duryee and Jaques' store in Chambers street.

X. 82. Didn't you team anything else but hat-cases?

A. Sometimes we would have a load of empty barrels, sometimes a load of empty car-bags.

X 83. Did you go to no other places than Duryee and Jaques' hat-store?

A. I went to several other places when they would send me for things to take to Newark.

X. 84. Was any one in company with you on either occasion of bringing those two machines?

A. There was a boy who used to ride with me and was with me on one of the occasions, but can't say whether it was the first or last.

X. 85. What was the boy's name?

A. Charles Callighan.

X. 86. Where did he live?

A. The last I heard of him, he was in Philadelphia.

X. 87. Did you ask for or get a receipt at Burr's factory for the machines taken there, or either of them?

A. Not that I can think of, sir.

X. 88. Did you take any paper or letter with you from Duryee, Jaques & Co's factory at the time of taking the machines?

A. Well, I couldn't say for certain whether I did or not.

X. 89. Where do you live in Newark?

A. In Beaver street, right by the factory, with my father.

X. 90. What number Beaver street?

A. No. 4, sir.

596 X. 91. Where is your father at this time?

A. In Newark.

X. 92. Has he been here at any time during this examination?

A. Not that I know of.

X. 93. Is he engaged in teaming now for Duryee, Jaques & Co.?
A. Yes, sir.

SAMUEL BROWN.

Subscribed and sworn to before me this 28th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

John S. Rice, being sworn on the part of the defendants, this 21st September, 1861:

Q. 1. What is your name, age, residence, and occupation?
A. John S. Rice, forty-two years of age, reside at Newark, New Jersey, and am a hatter, and have been so about twenty-six years.
Q. 2. Have you ever tried a revolving carding-cylinder in connection with a quick fancy, in a Burr hat-body machine, for throwing the fur?
A. I have.
Q. 3. Have you ever tried a revolving brush in connection with feed-rollers, for throwing fur in a Burr machine?
A. I have.
Q. 4. Have you ever tried a revolving fan in connection with the carding-cylinder, for throwing fur in a Burr machine?
A. I have.
Q. 5. How do these several arrangements of throwing fur compare as to the manner in which they disintegrate and throw the fur?
A. They compare equally as good as when it is thrown by the brush and feed-rollers.

JOHN S. RICE.

Sworn to before me this 21st day of September, 1861.

R. E. STILWELL,
U. S. Commissioner.

597 SEPTEMBER 27*th*, 1861.

Mr. Harding offers in evidence Seth Boyden's patents No. 25300, dated the 30th day of August, 1859, and No. 26811, dated January 10th, 1860.

SEPTEMBER 28*th*, 1861.

Mr. Harding offers in evidence a model of Hezekiah Miller's patent, marked Exhibit 31, and also model Exhibit No. 32, representing the drawing figure 1, sheet 1, of English patent 7608, with the exception of the driving-pulleys, belts, and gearing, which are admitted by complainant's counsel to be correct models of the patents.

Mr. Harding offers in evidence also model Exhibit 33, as the trunk which Harvey Kelley and Samuel Doughty saw used, and complainant's counsel admitted it to be such.

No. 25300.

THE UNITED STATES OF AMERICA.

To all to whom these letters patent shall come:

Whereas Seth Boyden, of Newark, New Jersey, has alleged that he has invented a new and useful improvement in machinery for hardening hat-bodies, (he having assigned his right, title, and interest in said improvement to himself and H. H. Jaques, of said Newark,) which, he states, has not been known or used before his application, has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said
598 Seth Boyden and H. H. Jaques, their heirs, administrators, or assigns, for the term of fourteen years from the thirtieth day of August, one thousand eight hundred and fifty-nine, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Seth Boyden, in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof, I have caused these letters to be made
[L. S.] patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand, at the city of Washington, this thirtieth day of August, in the year of our Lord one thousand eight hundred and fifty-nine, and of the independence of the United States of America the eighty-fourth.

JACOB THOMPSON,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

S. T. SHUGERT,
Act'g Commissioner of Patents.

THE SCHEDULE REFERRED TO IN THESE LETTERS PATENT AND MAKING PART OF THE SAME.

To all whom it may concern:

Be it known that I, Seth Boyden, of Newark, in the county of Essex and State of New Jersey, have invented a new and useful machine for manufacturing hat-bodies, and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Fig. 1 is a side sectional view of my invention, taken in the line *x*, *x*, fig. 2.

Fig. 2 is a horizontal section of ditto, taken in the line *x'*, *x'*, fig. 1.

Fig. 3 is a side sectional view of a portion of ditto, taken in the line *y*, *y*, fig. 4.

599 Fig. 4 is a face view of the portion shown in fig. 3.

Similar letters of reference indicate corresponding parts in the several figures.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it:

A represents a rectangular frame which may be constructed in any proper way to support the working parts of the machine. B is a picker cylinder on the frame A, directly in front of an endless feed apron C, and *a* is a pressure roller at the inner end of apron C. D is a curb or guard which extends over the picker cylinder. The above parts are shown in figs. 1 and 2, and being old and well known for the purpose here used, a more minute description is not deemed necessary.

E is a perforated cone or former, attached to the upper part of a vertical shaft F, and over a suction blast spout G. This cone or former is constructed and arranged relatively with the spout G in the usual way. In the frame A a driving shaft H is placed, from one end of which the picker cylinder B is driven by a belt *b*. The apron C is driven from the opposite end of said shaft by a belt *c*, and the perforated cone or former E is driven from said shaft H by a belt *d*.

On the end of the frame A, where the former E is placed, a frame, I, is hung at one end, so as to open and close or fit snugly to the end of the frame like a gate. This frame is of quite simple construction, being formed of two uprights or slightly inclined bars *d*, *d*, connected at their upper and lower ends by traverse bars *e*, *e*, which are attached at one end to a shaft or arbor *f* fitted in bearings *g* on the frame A, the arbor *f* and bearings forming the joint or hinge on which the frame I swings.

In the lower part of the frame I a shaft is placed, and is rotated from the driving shaft H by a belt *h*. On the shaft J there are two small eccentrics *h' h'*, to each of which a connecting rod or pitman *i* is attached, and the upper ends of these connecting rods or pitmen are attached to tubes *j j*, one to each, said tubes being fitted and allowed to slide freely on extensions *k* of the bars *d d* of the frame I, the extensions *k* being narrower and thinner than the bars *d*.

To the upper part of the frame I two arms, *l l*, are attached,
600 in the outer parts of which a shaft K is fitted. The shaft K is rotated from the shaft J by a belt *m*, the shaft K having a quicker motion in consequence of the pulley *n* on shaft K, being smaller than the pulley *o* on shaft J. On the shaft K there are two small eccentrics *p p*, to which connecting rods *q* are attached, one to each. These rods *q* are attached to bars L, the lower ends of which are connected by joints *r r* to the lower traverse bar *e* of the frame I. The bars L L extend up back or at the outer side of a cloth M, the edges of which are attached to the tubes *j j*. The eccentrics *p p* have opposite positions on the shaft K.

The frame I has an inclination corresponding with that of the periphery of the former E, so that the cloth M will be parallel with the surface of the cone, as shown clearly in figure 1.

On the end of the frame A, near the frame I, a hook *s* is attached for the purpose of retaining the frame I close to the frame A.

The operation is as follows: the fur is placed by hand on the apron C, which carries it to the picker cylinder B. The latter, by its rotation in the direction indicated by the arrow, takes it from the end of the apron and throws it in front, to be conveyed by a blast or other suitable means on the cone or former E, the suction blast within said cone or former causing the fibres of fur to advance to the cone. While this process is in progress, the cloth M is pressed against the fur on the cone by the atmosphere, a result due to the suction within the cone, and the cloth M is moved up and down by the eccentrics and pitman on shaft J, and at the same time has a lateral motion given it by the pitman *q* of shaft K, said pitman *q* working in opposite directions, and rather more rapidly than the pitman *i*. This unequal movement of the pitman insures the working of the cloth M in such a way as to effectually felt or harden the fur as it is thrown on the cone or former, the cloth having what may be termed a compound movement, which greatly augments its rubbing action. The operation of the cloth M is not extended beyond the forming process, that is to say, as soon as all the fur necessary to form a hat-body has been distributed on the cone or former E, the whole work of forming and hardening is completed, so rapidly does the cloth M perform its work. When the hat-body is formed the frame I is swung out from the frame A, and the cone or former E is rendered perfectly accessible, so that the finished body may be readily removed, the frame I again closed, and the operation repeated.

601

By this invention a vast deal of labor is saved in the manufacture of hat-bodies, as hitherto the bodies have been formed at one operation; that is to say, the fibres loosely put together on a perforated cone or former, and then, by a separate and distinct operation, hardened for the hatter's use.

I do not claim the rotating perforated cone or former, with a suction-blast within, nor do I claim the picker-cylinder with endless feed-apron, for such devices are in common use and well-known, when combined as herein shown, as a machine for forming hat-bodies.

I claim therefore as new, and desire to secure by letters patent:

1. The employment of a cloth M, or its equivalent, in combination with a cone E, in the manner and for the purpose substantially as herein shown and described.

2. The arrangement and combination of the frame I, shaft J, eccentrics (h^1,) rods (i,) tubes (j,) arms (l,) shaft K, eccentrics (p,) rods (q,) bars L, and cloth M, substantially as herein shown and described, so that the cloth M will be operated with a compound movement, as set forth.

SETH BOYDEN.

Witnesses:

PHILIP BOILEAU JONES, *Phil'a.*

J. W. COOMBS.

Copy of letters patent granted to Seth Boyden and H. H. Jaques, on the tenth day of January, 1860, for improvement in machinery for forming hat-bodies, invented by Seth Boyden, of Newark, N. J.

To all whom it may concern:

Be it known that I, Seth Boyden, of Newark, in the county of Essex, and State of New Jersey, have invented a new and useful improvement in machinery for forming hat-bodies; and I do hereby
602 declare that the following is a full, clear, and exact description of the same, reference being to the annexed drawings making a part of this specification, in which—

Figure 1, is a side sectional view of my invention, taken in the line *y*, *y*, of figure 3.

Figure 2, a transverse vertical section of ditto, taken in the line *x*, *x*, of figure 1.

Figure 3, a plan or top view of ditto.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to an improved mode of directing or guiding the fur to the cone, as hereinafter fully shown and described, whereby trunks and all other comparatively complicated appliances hitherto used for the purpose are dispensed with, and an exceedingly simple and efficient device substituted therefor.

The invention consists in placing directly in front of the picker a plate, so bent or curved that its surface will have a certain relative position with the axis of the picker and the surface of the cone, and give such a direction to the fur, as the latter is thrown on it by the rapid motion of the picker, that the fur will be drawn properly on the cone by the exhaust or suction within it.

To enable those skilled in the art to fully understand and construct my invention, I will proceed to describe it.

A represents a rectangular frame, and B is a perforated cone placed on a shaft C, fitted vertically in the frame, and arranged with a suitable exhaust fan. D is a picker fitted between suitable uprights *a*, *a*, on the frame, and having in front of it an endless feed apron E, over the inner part of which a roller *b*, is placed. The perforated cone with an exhaust-fan below it, the picker D, and feed-apron E, are old devices, in common use, and therefore do not require a minute description.

At the inner or back parts of the uprights *a*, *a*, there is a curved plate F, and below the picker there is a concave, G; the plate or concave are connected together. The plate F is parallel with and directly back of the picker D, and in close proximity to it, and said plate is curved so as to have its highest point at the centre, as shown clearly in figure 2. The plate gradually curves downward and
603 outward at each side of its centre, with a slightly concave form as shown in the figure just alluded to. This plate F, besides the longitudinal curvature above described, is curved transversely, corresponding with the surface of the cone B, as follows: the highest and central part of the plate F has its surface in line or in a plane which bisects longitudinally the axis of the picker D, and strikes the

apex of the cone; and the surface of said plate F, at each side of its centre and highest point, is formed of portions of planes which bisect longitudinally the axis of the picker and points on the cone extending down to its base. This gives what may be termed a compound curvature to the plate, one being longitudinal and the other transverse.

The position of the planes above described is shown by the red dotted lines in figure 1. It will be seen by referring to this figure that they all extend from the axis of the picker, and strike the cone at points extending from its apex to its base.

The picker D, although of usual construction, is rotated in a reverse direction to those in ordinary machines. The arrow indicates the direction of its movement. The fur from which the hat-bodies are formed is placed on the apron E, which conveys it as usual to the picker D. The picker, by its rapid rotation, conveys the fur around on the plate F, which, in consequence of being curved as described, causes the fur to be projected towards the cone B, in a series of planes extending from its apex to the base, the exhaust or suction within the cone drawing the fur on it after the proper direction has been given the fur by the plate F, the velocity of the picker being sufficiently great to project the fur within the influence of the exhaust of the cone. The concave, G, permits any fur that might escape down between the plate F and picker to be brought up by the latter, and again projected on the plate F.

This peculiar curvature of the plate F not only gives the proper direction to the fur, so that the latter may properly cover the cone, but it also directs the fur to the cone in proper quantity; for instance, the central and highest part of the plate F is comparatively a short curve and directs a small quantity of fur to the upper part of the cone where but a small portion is required; but it will be seen that the lower part of the plate F has a double curved surface to supply the cone, one at each side of its centre, so that the cone will be properly fed or supplied, the supply gradually increasing from the top to the bottom of the cone.

604

I would remark that although the surface of the plate F has been described as being in planes extending from the apex to the base of the cone, and all bisecting the axis of the picker, still a slight departure is made from this rule; and that is, the plate F is slightly elevated at its outer edges or towards the cone from the positions above stated, in order to compensate for gravity, the latter serving to counteract in a measure the power of the exhaust and that of the picker, and give a downward movement to the fur. By slightly elevating the direction of the fur above its otherwise proper path, due provision is made for such a contingency.

I do not claim the cone nor the picker; neither do I claim the feed apron; but I do claim as new, and desire to secure by letters patent, the fur director of plate F, curved or bent substantially as shown, and arranged in relation with the cone B and picker D, to operate substantially as and for the purpose set forth.

SETH BOYDEN.

Witnesses:

J. W. COOMBS.

R. S. SPENCER.

SEPTEMBER 23*d*, 1861.

Edward A. Nichols, being called on the part of the complainant, deposes and says:

Q. 1. What is your name, age, residence, and occupation?

A. Name, Edward A. Nichols; age, 41 years; residence, Brooklyn; occupation, hat merchant.

Q 2. In what concern are you engaged, and in what capacity, and to what extent, if any, does that capacity bring you in connection with the manufacture of hat-bodies?

A. Concern of Swift, Dickinson, & Co.; am a member of the firm, and am exclusively engaged in the manufacture of hats.

Q. 3. Do you make your own hat-bodies, or do you get them made, and if you get them made, by whom?

605 A. They are principally formed by Israel D. Condit.

Q. 4. Did you witness an experiment for making hat-bodies on a machine at the factory of the complainant on Thursday last, in company with William Bodwell, Israel D. Condit, Samuel G. Starr, Henry B. Renwick, and others?

A. I did.

Q. 5. How many hat-bodies did you see made on that occasion?

A. Two.

Q. 6 What was the time consumed therein?

A. Well, I didn't keep any account of the time; the hats were forming when I went into the room. I should think it was at least fifteen or twenty minutes while I was in there before they were formed.

Q. 7. What was the character of the bodies that were formed?

A. They were very imperfect.

Q. 8. Did you examine them after being formed for the purpose of ascertaining their quality, and if yea, what did you ascertain in relation to their particular formation and quality?

A. I did; and, to use the hatter's phrase, "they were all in the tip," just contrary to what they ought to be.

Q. 9. Were they merchantable hat-bodies, or bodies from which a merchantable hat could be made?

A. They were not.

Q. 10. What were they good for, if for anything?

A. To be torn up and to be formed over on a decent machine.

Q. 11. In what way was the fur from the machine sent off in reference to its being conducted to the cones, without waste or otherwise?

A. When I went into the room it was flying in all parts of the room.

Q. 12. How did they manage to get it on to the cone?

A. Well, part of the fur went on to the cone; while I was there they swept up the flying particles which settled on to the floor and put it on the apron again.

606 *Cross-examined by Mr. Harding, counsel for defendants.*

X. 13. Did the fur pass throug the carding-machine before going to the cones?

A. A part of it went through the carding-machine; the fur that went on to the cone did go through the carding-machine.

X. 14. Did the fur deposit on the cone?

A. Yes, I believe it did, drawn there by suction.

X. 15. What was then done to the bat?

A. It was taken off as usual, first by the application of cloths, it was then dipped in a tub of hot water, the cloths were then taken off and the body slipped from the cone as usual.

X. 16. Was it an entire bat?

A. I should think it was.

X. 17. What experience have you had in machine made hat-bodies?

A. The experience of twelve years.

X. 18. When did you begin to use machine made hat-bodies?

(Objected to as not cross-examination.)

A. About twelve years ago

X. 19. Was there anything between the cone and the fur on that machine?

A. Nothing, unless the tin cover went between it.

X. 20. The tin cover of what?

A. Tin cover of the fan; whether it came over far enough to be between the cone and fan or not I can't say.

X. 21. Did you notice any other objection to the bat except the improper thickness of the bat in its different parts?

A. I did not; that was enough.

EDWARD A. NICHOLS.

Sworn and subscribed to before me, this 23d Sept., 1861.

R. E. STILWELL,
U. S. Commissioner.

607 Mr. Andrew Comstock recalled on the part of complainant.

Q. 1. Did you witness an experiment for making a hat-body or hat-bodies on a machine at the factory of the complainant in this city, on Thursday last, in presence of Henry B. Renwick and others?

A. I did not witness it in the presence of those gentlemen; there was one gentleman whom I did not know, now present, which is Mr. Renwick, now present.

Q. 2. What was the result of the experiment as to the character of the bodies formed, and as to their remarkable quality?

A. The quality of the body was very inferior; in fact, it was valueless as to workmanship: it was thrown upon the cone imperfectly, too much of the fur bodying upon the tip of the bat, and too little on the edge or brim. The body would have less value when it was formed than the material before it was formed.

Q. 3. How was the fur husbanded by the action of the machine?

A. Very imperfectly; too much running to waste.

Q 4. State whether the fibres of the fur were or were not evenly distributed throughout the room.

A. There was a very considerable percentage of the fur that went into the room.

ANDREW COMSTOCK.

Subscribed and sworn to before me this 23d September, 1861.

R. E. STILWELL,
U. S. Commissioner.

William Bodwell, being duly sworn and examined on the part of the complainant, deposes and says:

Q. 1. Where do you reside, and what is your occupation?

A. I reside at Milburn, New Jersey, and am a hatter by occupation.

Q. 2. In what business or capacity are you at present employed?

A. I am hat inspector for the United States for inspecting hats and caps in the quartermaster's department in the city of New York.

608 Q 3. How long have you followed the business of hatting?

A. Between forty and fifty years.

Q. 4. Did you witness an attempt to make a hat-body on a machine at the complainant's factory, in the city of New York, on Thursday last, the 19th inst.?

A. I did.

Q. 5. In whose presence?

A. Mr. Israel D. Condit, Mr. Arthur Nichols, Mr. John Hunt, Mr. Newton, Mr. Osborn, Mr. Starr, Charles Lighttisse, Mr. Comstock, Mr. Henry B. Renwick, Mr. Green, Mr. John Phillips.

Q. 6. How long were you there?

A. Full an hour; a little more, I think.

Q. 7. How many men were at work on the machine?

A. I think three. There may have been more.

Q. 8. Did you examine the work that they made?

A. I did.

Q. 9. What was the result?

A. The result was, in hatter's phrase, it would be found wrong end up, or otherwise thickest where it should be the thinnest?

Q. 10. What was thickest where it should be thinnest, and what was the thing attempted to be made?

A. The tip. The thing attempted to be made was a hat-body.

Q. 11. Hat-body on what?

A. On a perforated cone.

Q 12. What was the operation of the machine in reference to the fur being scattered about the room?

A. There were two cones with an exhaust underneath, and the fur was scattered all around. I think there were two persons there employed in brushing it up and putting it on the feed-apron to let it go through the machine again, to let it have a chance to get on the cone.

Q. 13. Brushing it up from where?

A. From the floor.

Q. 14. Could the machine which you saw there make a hat-body? (Objected to.)

609 A. I think not.

Q. 15. What story in the building was this?

A. The first story above the basement, I think.

Q. 16. Did you witness an experiment on more than one machine on that day?

A. No more.

Q. 17. How were hat-bodies formerly made?

A. By the action of a bow by hand; they are made now, I believe, universally by forming machines.

Q. 18. When did the change take place?

A. Well, I think they became pretty much to be formed by machines in 1849 to 1850.

Q. 19. When did the process of making them by machines commence?

A. I think somewhere about 1845 or 1846.

Q. 20. What machine brought about the change?

(Objected to.)

A. I know of no other machine except the Wells machine at that time which was used.

Cross-examined by Mr. Harding, counsel for the defendant.

X. 21. When did you first use hats made by machinery?

A. The first hats, I think, that were made by machinery, I used in 1836. They were made on the Blanchard machine. We used but a few of them.

X. 22. How long did you continue to use hat-bodies made by machinery?

A. I didn't continue to use them but a very short time. I don't think I used more than two or three hundred of them. From 1837 to 1849 I didn't use any machine hat-bodies, except a few in 1845 and 1846 and 1847, to try them. I didn't use them as soon as some others.

X. 23. Why did you not use the hat-bodies sooner, made by machinery, than 1849?

A. I didn't find it profitable.

X. 24. In what respect was it not profitable?

A. For my work I found it more profitable to use hand labor at that time.

X. 25. Why did you try them in 1845, 1846 and 1847?

610 A. I tried them, because if they were found profitable I should use them and save expense.

X. 26. How was it that you saved expense in 1849, and not before?

A. I think the price was reduced somewhat, and there became rather a scarcity of hands. The demand was better, and we were necessiated too.

X. 27. How did the machine-made hats and hand-made hats compare as to expense?

A. I think down to 1849 I could make a hand-made hat as cheap by hand as by machine.

X. 28. Do you remember the Wells machine being improved by Bur and Taylor?

A. So far as I can remember, I don't think that I knew anything about the improvement of Burr and Taylor on them.

X. 29. Do you know why hat-bodies were made cheaper, in and after 1849, by machine than from 1845 to 1849?

A. Well, I suppose it was on account that before that Mr. Wells had not perfected his machine, so as to get it in operation much.

X. 30. Why did you try hat-bodies in 1845, 1846 and 1847, if you knew that you could make them as cheap by hand as the bodies would cost you made by machine?

A. Because it was reported that the machine formed them better, and we always find it necessary to take hold of all improvements that will facilitate the manufacturing, in order to compete with others.

X. 31. Did you try them successively in each of the years, from 1845 to 1849?

A. I don't think I did; I can't say that I tried them in each of those years.

X. 32. What was the result of your trial of them, prior to 1849?

A. It was not satisfactory.

X. 33. Were you not anxious that the invention should succeed?

A. Yes, always anxious that all improvements connected with any branch of the hat manufacturing may succeed.

X. 34. Were you not a friend of Mr. Wells?

611 A. I was not any more a particular friend of Mr. Wells than any one else in the trade. I was anxious that his invention should succeed.

X. 35. In what way did the machine seem to be imperfect, at first, in the formation of the bat?

(Objected to.)

A. So far as the appearance of the work was concerned, it was more perfect than hand-work; and so far as hand-work is concerned, they bow it to suit their own hands in the size. I think they had to become accustomed to learn to use the machine work. It worked different from hand-work.

X. 36. Why did you say that the reason bats were made cheaper after 1849 was before Mr. Wells had not perfected his machine?

A. Because that is the reason.

X. 37. In what respect did he perfect it?

A. That I cannot say, only judging from the work. I didn't see his machine.

X. 38. In what way did the work show that he was perfecting his machine?

A. The work showed more perfection. It was clean—that is, that the body was perfected through the lay of the fur—the proportions, as they should be, through the length of the body, from the tip to the brim.

X. 39. What was the condition of the body, in the respects thus mentioned by you, before he had perfected it as you say?

A. The first bodies that he formed depended somewhat on a boy who attended the former. He had to guide the fur by a piece of pasteboard by hand, consequently would have some of the tips thicker than others—not properly proportioned.

(Objected to as not responsive to the question.)

X. 40. How was the improvement mentioned by you in the appearance of the bat brought about?

(Objected to because witness has already stated that he did not see the machine.)

A. I did not see any of those new improvements. I did not see the machine after it was first invented.

612 X. 41. When was it that the appearance of the work and the price was such as to induce you to use the machine?

A. I think in the neighborhood of 1849.

X. 42. Describe the machine which you saw at Mr. Burr's, in the presence of Mr. Renwick and others?

A. I should say there was an ordinary carding-machine in front of what I call the fancy; there is a small fan which blows the fur out over these two cones, that appeared to give direction somewhat, but the fur flew around a great deal on the floor. It gives direction to the fur over those cones. A great deal of the fur flew sideways all about; it didn't direct it so that it was a certain operation at all. The exhaust under this cone held it on to the cone—on to the tip the most part of it. The next operation was to put a cloth on it, wind it round it, and on that a perforated tin cone, then immersed in hot water; then taken out of that, taken from the cone and rolled up in a cloth, and the loose water expelled from it by wringing it. When it was unrolled it would be felted enough, so that you could take it in your hand and examine it. It looked like as if it was formed the reverse of what it should be.

X. 43. Were both bats alike?

A. They were, as near as may be. They may have been a little different. I was not so critical as to examine the exact weight.

X. 44. Where are those bats?

A. I don't know; have not seen them since that time.

X. 45. How many were formed?

A. Two at one operation.

X. 46. Was that all that were formed while you were present?

A. It was.

X. 47. Who worked the machine?

A. They were strangers to me. Mr. Burr's superintendent, Mr. Dodd, was there; he appeared to superintend.

X. 48. Who appeared to be working the machine—whose workmen?

A. I don't know whose workmen. Mr. Dodd was there. I know him.

X. 49. Do you not believe that they were Mr. Burr's workmen who worked that machine?

613 A. All that I judge by is, that they were in his factory, and,

as a matter of course, I supposed they were his. I know nothing about it. It is only matter of opinion.

X. 50. Was there anything between the fan and the cone at the time you saw it run?

A. No. There was a cover over the fan, but nothing between the cover and the cone.

X. 51. Did the fan revolve up or down, in front?

A. I wouldn't be positive about that, as I did not examine that particularly. It revolves fast, and when it is revolving it is difficult to say.

Direct resumed.

Q. 52. Do I understand you to say that you saw Wells' machine at any early period?

A. I did.

Q. 53. Where was it when you saw it?

A. I can't remember the name of the street. It was well up town, on the East river side, probably in the neighborhood of Houston street.

Q. 54. State whether or not it was in Rivington street?

A. It might have been. I can't recall it to mind.

Q. 55. How many times did you see it there?

A. I think about three times.

Q. 56 Was it there that you saw the boy or hand who attended the cone using the pasteboard?

(Objected to.)

A. It was there, and only there. I never saw the machine again until Mr. Burr had it under his control.

Q. 57. When and where did you first see it after Mr. Burr had it under his control?

A. I don't recollect the date; but I saw it in Hague street.

Q. 58. On the occasion last mentioned, did you see the machine in operation?

A. Did not examine the machine; I merely went into this factory on business; did not go to the machine; I saw that they were forming hats.

Q. 59. Did you notice whether or not a pasteboard was being used on that occasion?

614 A. I didn't notice anything about the machines.

Q. 60. Do you know whether they were at that time making good work?

A. I don't remember anything about it.

Q. 61. Of whom did you procure hat bodies made by the Wells machine when you used them for trial, and before you commenced using them entirely?

A. I think I procured them from Mr. Condit; I may have had some from Mr. Wells; I think I did, a few.

Q. 62. If from Mr. Wells, was it before the machine came under Mr. Burr's control?

(Objected to as leading.)

A. I think it was.

Q. 63. From whom did you obtain hat-bodies when you commenced to use machine bodies entirely?

A. I think the principal part were from Mr. Condit; I used some from Capt. Peck.

X. 64. Where were you then manufacturing?

A. Orange, New Jersey.

X. 65. How many bodies did you get made on the machine before you commenced using them generally?

A. I don't remember anything about it, how many I did.

Cross-resumed.

X. 66. Did you see see the machine work at Mr. Condit's?

A. I did.

X. 67. In what respect did it differ from the machine you saw at Mr. Wells, so far as the boy in person regulating the deposit, with the pasteboard on the cone, was concerned?

A. I don't recollect seeing any one use a pasteboard at Mr. Condit's; they might have done it, but don't recollect.

X. 68. Was the work done any better than at Mr. Wells'?

A. I don't remember much about it; all I had was a few specimens of Mr. Wells' work; so far as I can recollect, Mr. Condit's was as perfect as Mr. Wells'; I don't think there was much difference.

X. 69. Do you remember seeing the machine work in or about 1849?

A. I don't remember particularly about it; I had access to
615 the machines whenever I went down there; I dont recollect seeing anybody use the pasteboard at Mr. Condit's; I don't recollect anything about it.

WM. BODWELL.

Subscribed and sworn to before me this 23d September, 1861.

R. E. STILWELL,
U. S. Commissioner.

SEPTEMBER 25*th*, 1861.

H. O. Pierce, being sworn for the complainant, says, namely:

Q. 1. What is your name, age, residence, and occupation?

A. H. O. Pierce; 40 years of age; reside in Brooklyn; my occupation is hat manufacturing.

Q. 2. Do you carry on the business of manufacturing hats on your own account?

A. Yes, sir.

Q. 3. Have you recently seen hat-bodies made on a machine having a hinged hood-piece over the delivery end of the trunk?

A. I have.

Q. Have you shown that same machine to Henry B. Renwick, now present?

A. Yes, sir.

Q. 5. What was the quality of the hat-bodies made on that machine?

A. They were as perfect bodies as I ever saw.

Cross-examined by Mr. Harding.

X. 6. Was the hinged hood worked during the operation of forming a bat?

A. Yes, sir.

X. 7. Who worked the hinged hood?

A. Mr. Dodd.

X. 8. Mr. Burr's foreman?

A. Yes, sir.

X. 9. How many bats did you see formed?

616 A. I saw three.

X. 10. How long were they forming them?

A. About one minute and three-quarters; I timed one.

X. 11. Did you ever see a Wells machine with a hinged hood worked before?

A. No; not to my knowledge.

X. 12. How long have you been using machine hat-bodies?

A. I can't recollect exactly; about fifteen years, I think.

X. 13. Who did you get the first of?

A. The first I got in New York, said to be formed by Mr. Burr.

X. 14. Did you see the machine on which they were formed?

A. No, sir; I did not.

H. O. PIERCE.

Subscribed and sworn to before me this 25th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

SEPTEMBER 25*th*, 1861.

John C. Richardson, being sworn for complainant, deposes and says as follows, namely:

Q. 1. What is your name, age, residence, and occupation?

A. John C. Richardson; 33 years of age; reside in Newark, New Jersey; occupation, hatter.

Q. 2. Do you carry on the manufacture of hats on your own account?

A. Yes, sir.

Q. 3. Have you been present at the formation of hat-bodies, at Mr. Burr's place, on a machine having a hinged hood-piece over the delivery end of the trunk?

A. Yes; I have.

Q. 4. When?

A. Some three or four weeks ago, I think.

Q. 5. Have you shown that same machine to Henry B. Renwick?

A. Yes, sir.

Q. 6. What was the quality of the hat-bodies you saw formed by that machine?

617 A. They were good bodies.

Q. 7. How did they compare in quality to the hat-bodies which you use in your factory?

A. They were as good as any we used.

Q. 8. Where do you have formed the hat-bodies which you use in your factory?

A. We have some formed at H. A. Burr's, in Cliff street, some at his mill in Newark, and some formed at Duryee, Jaques & Co.

Cross-examined.

X. 9. How was the relative thickness of the bat produced; by what part of the machine?

A. It was produced by the hood.

X. 10. Was that worked while the bat was formed?

A. Yes, sir, by the man at the cone.

X. 11. Who worked the hood while you were there?

A. Mr. Dodd.

X. 12. Was that Mr. Burr's foreman?

A. The man who has charge at Mr. Burr's—general charge of the mill.

X. 13. How many bats did you see formed?

A. I think there was some six or seven while I stood there.

X. 14. When did you begin to use the machine hat-bodies?

A. When I was an apprentice we worked them then, as far back as 1849, just at the time I was through my apprenticeship.

X. 15. Who were you then apprentice with?

A. Rankin, Duryee & Co.

JOHN C. RICHARDSON.

Subscribed and sworn to before me this 25th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Samuel G. Starr, being recalled on the part of the complainant:

Q. 1. Have you recently seen hat-bodies formed on a ma-
618 chine with a hinged hood-piece over the delivery end of the trunk?

A. I have.

Q. 2. Have you shown that same machine to Henry B. Renwick?

A. I have.

Q. 3. What was the quality of the hat-bodies you saw formed on that machine?

A. They were very fair bodies.

Q. 4. Have you recently been present at an attempt to form hat-bodies by a machine which was called an English machine?

A. Yes.

Q. 5. Was Henry B. Renwick also present?

A. He was.

Q. 6. What was the result of the attempt?

A. The result was in forming two very imperfect bodies.

Q. 7. State whether or not they were worthless.

A. They would so be considered now.

Cross-examined by Mr. Harding.

X. 8. Was a continuous bat formed on the English machine?

A. It was.

X. 9. Why do you say the bat would be considered worthless now, that was formed on the English machine?

A. On account of the manner which the fur was laid on the cone, there being nothing to direct the fur in a proper manner to produce a good body, the tip being the heaviest part instead of the lightest.

X. 10. Who worked the hinged hood on the other machine, to which you have alluded to, on the occasion of your visit?

A. Mr. Dodd.

X. 11. Mr. Burr's foreman, do you mean?

A. Yes, sir, Mr. Burr's foreman.

X. 12. What was the effect of working the hood?

A. To direct the fur to the different parts of the cone, as required to make the body of the proper thickness in the different parts.

X. 13. Did you ever see a Wells machine with a hinged hood before?

619 A. I think I saw bodies formed in that manner in the building occupied by Mr. Burr, in Hague street, some ten or twelve years ago.

X. 14. When did you substitute the machine hat-bodies for hand-made hat-bodies?

A. Soon after Mr. Burr commenced forming.

SAMUEL G. STARR.

Subscribed and sworn to before me, this 25th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

SEPTEMBER 25*th*, 1861.

Henry B. Renwick, being recalled on the part of the complainant.

Q. 1. State whether or not you have examined and understand the contents of the originals or copies of the letters patent to Thomas R. Williams, A. D. 1833, No. 6387; William Ponsford, A. D. 1839, No. 7935; William Angus Robinson, A. D. 1838, No. 7608; Henry A. Wells, A. D. 1837, No. 7397; Thomas Robinson Williams, A. D. 1840, No. 8646; Stephen Hulbut, June 13th, 1831; William Fosket, reissue, March 23d, 1858, and the prior patent of Fosket, dated January 23, 1846; Hezekiah Miller's patent, March 5, 1839; Thomas Blanchard's patent, June 14, 1837; Thomas R. Williams's American patent of April 24, 1840; the patent of Wells, James & Peck, dated September 22, 1837, No. 383; the patent granted to Wells, James & Peck, dated September 22, 1837, and No. 392, also the specification contained in the copy of the application of Williams, Exhibit No. 5 also letters patent of Lemuel Lyons, dated February 5, 1847, No. 4951.

A. I have, and I do understand the contents thereof.

Q. 2. State whether or not you find in said letters patent and documents, or any of them mentioned in the last question, the combina-

tion, or substantially the combination, specified in the second claim of the Wells reissue patent No. 1087.

A. I do not.

620 Q. 3. State whether or not you find in those patents and documents, or any of them, the combination, or substantially the combination, specified in the first claim of said Wells reissue patent No. 1087.

A. I do not.

Q. 4. State whether or not you find in those patents and documents, or any of them, the combination, or substantially the combination, specified in the fourth claim of said Wells reissue patent 1087.

A. I do not.

Q. 5. State whether or not you find in the patents and documents mentioned in the first question, or any of them, or in any of the Wells patents, the combination, or substantially the combination, specified in the first claim of the letters patent to Lansing E. Hopkins, dated September 21, 1852, and No. 9484, or the combination, or substantially the combination, specified in the third claim of said Hopkins patent.

A. I do not.

Q. 6. State whether or not you find in the patents and documents or any of them mentioned in the first question, or in any of the Wells patents, or in the said Hopkins patent, the combination of a vibrating concave surface with an exhausted pervious cone for hardening hat-bats.

A. I do not.

Q. 7. State whether or not the combination of a rotating picker, a pervious exhausted former, and a lower movable deflector will make hat-bodies of the required thickness.

(Objected to.)

A. It will.

Q. 8. State whether or not a combination of rotating picker, an exhausted pervious former, and an upper movable deflector, or hood, will make hat-bodies of the required thickness.

(Objected to.)

A. It will.

Q. 9 State whether or not you find in the patents and documents mentioned in the first question, or in any of them, or in any of the Wells patents, a swinging frame, carrying a device to and from a bat upon the former to harden it, and which when hardening vibrates in the direction of the length of the cone or former, or anything substantially the same.

621 (Objected to as irrelevant.)

A. I do not.

Q. 10. State whether or not you find in the patents and documents, or any of them mentioned in the first question, or in any of the Wells patents, means of blowing the exhaust-air from the perforated cone through a conductor so as to discharge it towards the cone to aid in carrying the current of fur towards the cone.

A. I do not.

Q. 11. State how you would construct the exhaust-box of a fan-

blower working according to the specifications of the Hopkins patent, and give your reasons

(Objected to as immaterial.)

A. I would construct it in the ordinary and well-known way, with an aperture on top on which to place the cone, and an aperture for air to pass to waste, and also with another aperture connected by a pipe with an air-chamber beneath the picker. I would make the hole in the exhaust-box for the air to blow to waste, for the reason that that is the well-known way of constructing exhaust-boxes, because the patent speaks of the exhaust-fan as a well-known device, because the patent says the chamber beneath the picker may receive an additional supply of air from the fans at the sides of the picker, and because I know that if the whole of the air blown by the exhaust-fan was blown out under the picker, that the machine would be inoperative. The drawings, moreover, show the pipe leading from the exhaust-box to the air-chamber as entirely too small to conduct away from the exhaust-box all the air which would be delivered by an exhaust-fan of the ordinary kind used in machines for forming hat-bodies. Both the smallness of the pipe and the statement in the patent as to an additional supply of air convinced me that part of the air from the fan is to go to waste, and therefore that the exhaust-box is to be constructed in the usual way with an aperture for waste air.

Q. 12. State whether or not you have recently been present, where efforts were made to form hat-bodies by a machine, which was called an English machine, and where Andrew Comstock, William Bodwell, Edward Arthur Nichols, Samuel G. Starr, Avery Green, Israel
622 D. Condit, John Hunt, and others were present, and if yea, what machine was it?

A. I was present at efforts to form hat-bodies on a machine which I have heard called an English machine. The machine was what I call a Williams machine, and was constructed in substantial accordance with the drawing on figure 2, sheet 2 of Williams' patent of February 14, 1833, No. 6387, and the description thereof in the said patent.

Q. 13. State how that machine corresponded with figure 6, marked canceled in Exhibit No. 5?

A. It is substantially the same with that figure, except that the machine I saw experimented with has a curved piece of metal in front of the fan, which is shown in the English specification, and is not shown in the canceled drawing.

Q. 14. What was the result of that effort to form hat-bodies?

A. The fur that was fed into the machine was partly delivered on to the cones or former and partly thrown into the air about the room, from the card-clothed cylinders of the carding-machine. That which was thrown into the air was swept up and thrown into the machine again. By persevering in this way, nearly all of the fur was passed through the machine and delivered on to the cones, where it was held by the exhaust. The bats covered the cones, but were very thick on top, but grew gradually thinner towards the part which forms the outside brim of the hat. The deposit of fur was not regulated or proportioned upon the cone, as it is by the various hat-body machines

which I have seen in operation, and, although not a practical hatter, I was able to see that it would not be possible to make a merchantable hat from the bats formed on this Williams machine. I did not time exactly the time elapsed in forming the two bats, but think that it took about twenty minutes to form them. One man was employed in feeding the machine, and three others during portions of the time, in sweeping up the fur scattered about the room and returning it to the feeding-belt.

Q. 15. What conclusion was expressed by the gentlemen who witnessed the effort, as to the value of hat-bodies formed on such a machine?

(Objected to, as a direct request to witness to furnish hear-say testimony.

623 A. I heard several of them express the opinion that the bats were perfectly worthless—not worth so much, in fact, as the fur from which they were formed. That is the substance of their remarks.

Q. 16. Have you recently been shown a hat-body forming machine by Samuel G. Starr, John C. Richardson, and H. O. Pierce, who were examined this morning, and if yea, what kind of a machine was it?

A. I have, and the machine they showed me was the Wells machine, at Mr. Burr's factory, referred to by me in my former examination in this case.

Q. 17. State whether you have examined Exhibits 18 *A*, 18 *B*, and 18 *C*?

A. I have.

Q. 18. State whether or not the construction of them indicates that 18 B and 18 C belongs to or are to take the place of any part of 18 A?

A. I do not see any thing in Exhibits 18 B and 18 C which indicates that they are to be substituted in place of any part of Exhibit 18 A.

Q. 19. How do Exhibits 18 B and 18 C appear to be adapted to be used in connection with a carding machine, represented in the canceled figure 6 of Exhibit 5, being the application for Williams' American patent?

A. They appear to be well adapted for that purpose, Exhibit 18 C appearing substantially like the cone-stand represented in that figure, and having a hole in the top, between the two large holes, which would represent the step for the upright shaft shown in that same figure; 18 C has also a flange below, corresponding with the flange on the cone-stand in that same figure, and, like it, capable of fitting into the draft-box below.

Adjourned to the 27th instant, at 10 a. m.

FRIDAY, *September 27th*, 1861.

Q. 20. State whether you have experimented to ascertain whether in running the Wells machine without a trunk, the exhaust through the cone would produce a current of air through the aperture under the picker towards the cone, and if yea, explain the experiment and the result of it?

624 A. I have tried the experiment. I took a Burr and Taylor

machine, took the trunk off, shut up the doors leading into the room, and laid a board over the belts of the machine, so as to prevent the currents made by them from interfering with the experiment, then tied a piece of fur on to a piece of thread, let the fur hang behind the aperture behind the picker. I then started the fan and left the picker standing still. I found that the fur was attracted towards the cone by the current of air induced by the fan, there being a very perceptable current proceeding from under the picker towards the cone. I also held little pieces of fur in my fingers under the picker, and let go of them, and they were attracted towards the cone and deposited on it.

Q. 21. State whether you find anything in the specification of the original Wells patent or in the specification of any of the reissues thereof requiring a delivery end of the trunk to be of any exact form.

(Objected to.)

A. Yes, in connection with special form of cone.

Q. 22. Explain what you mean by your last answer.

A. I find in substance this statement in the patent and re-issues, that the delivery aperture is to be nearly of the form of the cone, but narrower and higher; and I find in the drawing a certain width of bottom of the trunk on the outside, showing that the aperture can be no wider than that, and a cone standing opposite thereto of a certain proportion and also the elevation of the aperture shown.

(Answer objected to by defendants' counsel.)

Q. 23. What would a mechanic, working according to the Wells specification, be guided by in forming the delivery end of the trunk?

(Objected to.)

A. I should be guided by the specification and drawing.

Q. 24. Would the shape and size of the cone to be used influence the forming of such delivery end?

(Objected to.)

A. It would influence me. For the taper cone I should make a delivery aperture tapering towards the top; with a nearly straight sided forming cone, I should make the aperture with very little taper upwards.

625 (Objected to by defendants' counsel.)

Q. 25. If the delivery end of the trunk be formed to operate without the hood, what provision would there be for different sized cones?

A. None except very slight ones, which would be the speed at which the machine was run, and the adjustment of the relative height of the cone and hood as shown in the patent by the set screw underneath the hood.

Q. 26. In case there were cones varying considerably in size and no hood were attached to the trunk, what would be necessary to use for different sized cones?

A. You would have to have as many or nearly as many trunks as cones. Each trunk with an aperture conforming to the shape of the cone, but narrower and higher.

Q. 27. State whether the delivery end of the trunk, Exhibit 19, is

constructed in accordance with the specification of the Wells patent, No. 1087, taking the description and drawings together.

A. I should say not. (Witness asks if this whole thing is Exhibit 19.)

Q. 28. Exhibit 19 is what I now point out, being a board box representing a trunk. Is or is not the delivery end of it constructed in accordance with the specification of the Wells patent, reissue No. 1087, taking the description and drawings together? I mean the form of the opening or aperture of the delivery end.

A. It is not.

Q. 29. Look at the board marked Exhibit I, and state how the hole through it corresponds with what is the form of the delivery aperture of the trunk, when constructed according to the specification of the Wells patent last mentioned.

A. When constructed according to the specification and drawing, the hole in the exhibit is the shape and size that I should make of the delivery aperture of the trunk.

Q. 30. Please give your reasons briefly.

A. My reasons are the statement in the patent as to the conformity of shape between the opening and cone, and the hight of the trunk aperture shown in the drawing, and the shape of the cone shown in the drawing, as standing opposite the aperture.

626 Q. 31. State whether there is any substantial difference in the description of the delivery end of the trunk between the original Wells patent and said reissue 1087.

A. There is none.

Q. 32. Have you been present at the formation of hat-bodies this morning, where were also present Andrew Comstock, H. O. Pierce, and Samuel G. Starr; if yea, where was it?

A. I was present. It was at Mr. Burr's factory in this city.

Q. 33. Did you see them formed on machines without a hood over the delivery aperture of the trunk, and without the Burr & Taylor improvements, and if yea, on how many of such machines?

A. I saw them formed on one machine without a hood and without any Burr & Taylor improvements, and on another machine which had cloth-covered rollers, and a trunk with flexible sides and movable top, and no hood.

Q. 34. What was the form of the delivery end of the trunk of the machine which did not have the flexible sides, cloth-covered rollers, and movable top?

A. This piece of board, Exhibit H, is the form of the delivery end of the trunk, the outside of the board showing the inside of the opening.

Q. 35. What do you mean by the inside of the opening?

A. I mean the hole at the end of the trunk nearest the cone through which the fur was delivered.

Q. 36. Had you previously seen hat-bodies formed on that machine using a hood?

A. I had, several times, on different shaped cones from the one used this morning.

Q. 37. State whether that was the same machine which you have

previously testified was a Wells machine, which you have seen operated with a hood in presence of Mr. Pierce, Starr, and others.

A. It was the same that they showed to me as having seen used with a hood.

Q. 38. State whether the shape of the delivery aperture of the trunk was the same, when it was operated this morning without a hood, as it was when you saw it operated with a hood.

627 A. It was the same.

Q. 39. What was the quality, so far as you were capable of judging, of the hat-bodies formed on that machine this morning without a hood?

A. I do not consider myself a capable judge; but as far as I could judge, by comparison with hat-bodies formed in the ordinary working of that factory, they were good.

Q. 40. You say one of the machines that you saw operated this morning without a hood had cloth-covered rollers, and a trunk with flexible sides, and a movable top; state whether there was any bending of the flexible sides, or adjusting of them, or any moving of the top, while the hat-bodies were being formed this morning on that machine.

(Objected to.)

A There was not.

Q. 41. What was the form of the delivery aperture of the trunk of that machine while it was forming hat-bodies this morning in your presence?

A. The form of the aperture through the board, Exhibit I.

Q. 42. So far as you are capable of judging, what was the quality of the hat-bodies made on the last-mentioned machine, with the delivery end of the trunk of the shape of the aperture through Exhibit I?

(Objected to.)

A. The quality was good.

Q. 43. In the last-mentioned machine you say there was a movable top; state whether that is one of the improvements known as the Burr & Taylor improvements.

(Objected to.)

A. It is, when taken in connection with the flexible sides.

Q. 44. State what facility the flexible sides and that movable top furnishes in adapting the delivery end of trunks to different-sized cones.

(Objected to.)

A. It enables you to adapt it, in size and shape, to any form of cone that it may be desired to form a hat on.

Q. 45. State whether you saw many cones in Mr. Burr's factory; and if yea, how they were as to variety of sizes and forms.

628 (Objected to.)

A. I seen a great many, of different sizes and forms.

Cross-examined by Mr. Harding, counsel for defendants.

(Mr. Harding requests permission to examine the machines in operation on which the experiments testified by Mr. Renwick were tried,

in order to enable him to cross him properly as to the construction of those machines; or Mr. Harding requests the production of the machines before the examiner, at his expense.)

(Counsel for complainant replies, that he has sent for the trunk and cones used this morning to be immediately brought here, and that he shall make them exhibits in this case, and that he will have the machines here as soon as they can be got here.)

X. 46. Will the rotating brush, the hinged hood, and the pervious cone, shown in the drawings of reissue 1087, constructed and arranged relatively to each other, as there shown, without trunk and lower hinge-flap, produce a hat-body of the required thickness of parts? I suppose in my question that the hinged hood is supported or held in the position in the drawings, and is of the construction shown in those drawings.

(Objected to, on the ground that it could not be held in the exact position represented in the drawing, if there were no trunk.)

A. It will not, if the hinge of the hood was held by some means in the exact position shown in the drawings, and if the hinged end of the hood was no wider than is shown in the drawing.

X. 47. How do you know that a combination of a rotating picker, an exhausted pervious former, and an upper movable hood, will make hat-bodies of the required thickness, as stated by you in your 8th answer?

A. Because I tried it.

X. 48. What did you try precisely?

A. I tried a machine with feeding-belt, pervious cone, exhausting fan, and picker, all as usual; the hood had a top and side-cheeks, and was as wide as the picker was at the end nearest the picker,
629 was hinged above and in front of the picker and extending from there towards the cone, its end being as near the cone as the end of a trunk usually is; the free end of the hood had a cord attached to it, which ran through a staple in the ceiling, and had a counter-balance, so that the hood would stay in any position in which it was left, and the hood was moved up and down as needed by hand.

X. 49. Where is that hood?

A. If not broken up or used for something else which I know nothing about, it is down at Mr. Burr's; it was made of board; I left it there.

X. 50. What was the height and shape of the side-cheeks of that hood?

A. Each cheek was triangular shaped, and was, as near as I can remember, some six or seven inches in projection below the top at the end nearest the cone, and ran off to nothing at the hinge or picker end of the hood.

X. 51. What was the shape of the top?

A. The top was a flat piece made of several pieces of board fastened together; it was a parallelogram, and the cheeks were nailed on the under side of it; the cheeks approached each other as they got near the cone, being, as near as I can remember, a foot or fifteen inches apart at that place; the cheeks receded from each other as they went

towards the picker, and each cheek flared a little outwards as they dropped from the top-piece.

X. 52. Was there any horizontal board between the picker and the cone?

A In making some of the bodies, there was; in making others, there was not.

X. 53. The hood did not vary in shape materially from the upper section of a trunk, did it; such as in Exhibit 19?

A. It was like the top board of this trunk, but the cheeks at the cone end were more than double as wide apart as the sides of this trunk are; and the cheeks ran away to nothing at the picker end.

X. 54. Mark in a line on the side of that trunk Exhibit 19 a line that would show the shape of the cheeks.

A. The line marked cheek H B R represents about the bottom line of the cheek piece, as near as I can remember, and the top
630 of the trunk would represent the upper line; and the front of the trunk, from the top down to the line H B R would represent the other side of the triangle that bound the cheek pieces.

X. 55. What was between this movable hood and the floor of the building?

A. In some of the experiments, nothing except it may have been the shaft of the machine, and in others, a flat board, something like the bottom of a trunk, and occupying pretty nearly the same position, but lower; there was no side-piece of any kind to the board when it was used, and it was pretty nearly horizontal, sloping downwards, and towards the bottom of the cone.

X. 56. How did you work this apparatus in the process of forming a body?

A. I did not work it at all; the fan-picker and feed-apparatus were driven as usual by the engine, and the hood was moved up and down by one of the men employed about the factory.

X. 57. Who directed the construction of this hinged apparatus?

A. I did.

X. 58. How did you know what shape to give it?

A. I did not make of it any special shape; I took some boards that were nailed together about as wide as the picker, and extending from the picker pretty near to the cone. I then took a board that was lying beside the machine, and told the carpenter to slit it so as to make two triangular pieces, and then to bevel the upper edges of them so they would flare apart when nailed under the flat rectangular top-piece. I meant the whole thing, when done, to resemble somewhat the hood shown in the patent, but with a long top and the hinged end of it as wide as the picker.

X. 59. Quote the words of the specification which describe the arrangement and construction of parts, in the manner in which you constructed and put them together in trying that experiment.

A. The patent nowhere expressly states that the hood is to extend all the way from the picker to the cone; it does de-
631 scribe a hood "that directs the discharge and distributes the fibres on to the cone." The drawing shows that there is a continuous surface extending from the end of the hood to the picker,

and they show also that the hood is to be used between the picker and the cone, but there is no precise directions in the patent that the hinge should be just above the picker as I used it. In the precise construction shown in the drawing, the hinge is shown as being some distance from the picker and near to the cone.

X. 60. Quote all the words of the specification which would convey to the mind of the mechanic instruction how to construct that hood as you have constructed it? My question calls merely for quotation from the specification.

A. If you mean the precise and exact construction as used by me, there are no words.

X. 61. Quote the words of the specification which describe any practical construction and arrangement of these parts whereby the picker, pervious cone, and hinged hood can be used in combination so as to make a practical hat-body? My question calls for quotation from the specification.

A. There are no words describing the precise way in which to combine them so as to make a hat-body without a trunk.

X. 62. In the experiment tried by you was there not an equivalent for a trunk?

A. There was not.

X. 63. Did not the hinged deflector which you used constrain the fur as it left the picker and direct it towards the cone?

A. It did, and did do so properly, because it was moved up and down during the formation of a hat-body, whereas, on the contrary, trunk is stationary.

X. 64. Is it essential to the trunk that it should be stationary?

A. It is so described in the patent, and it is also described as constraining the fur, so that it passes through and is shaped conformably to a mouth-piece conforming to the shape of the cone, but narrower and higher; a trunk might have a small amount of vibration during the operation of forming a hat, and still make a good one; but if the vibration or movement were to a great extent, a good hat
632 could not be formed. I think it is essential that the trunk should not have such an amount of motion as would destroy its efficiency.

X. 65. Did not this hinged deflector which you experimented with perform the functions or accomplish the result which the trunk and hinged hood together perform, as exhibited in the drawings of the specification, reissue 1087?

A. It accomplished the same result, namely, a good hat, but it had nothing of the mode of operation of a trunk, nor did it perform its function. It performed the function of the hood only, but in a greater degree and to a greater extent than the precise hood shown in the drawing.

X. 66. How in a greater degree?

A. Because it accomplished the same result as is accomplished both by the trunk and the hood in forming bats or cones of any shape. The precise hood shown in the drawing, and mounted as therein shown, will not accomplish that result.

X. 67. What was the difference in the mode of operation of the

trunk specified in reissue 1087, and of the hood experimented with by you while effecting the same result?

A. The mode of operation of the trunk is to constrain the current of fur and make its cross-section and an approach to a cross-section of a cone, so that a bat may be formed on a cone conforming to the operation by a deposit which takes place over all parts of the cone at the same time. The hood as used by me does not constrain the current into any such shape; and when it was used the fur was deposited at different times on different parts of the cone, the hood resting opposite any given ring of the cone during the time, sufficient to deposit on that ring the desired quantity of fur, and then moving so as to deposit on another ring of the cone. The thickness of deposit in the latter case, or of the hood, depended upon the time during which the hood was acting opposite any given spot upon the cone. The thickness of deposit on different parts of the cone, in the former case or with the trunk, depends upon the relative shape of the mouth-piece and cone or former.

X. 68. Does not the hinged hood as used by you operate as a conduit to convey the fur in its passage from the picker to the cone?

A. It, in connection with the current of air below it, serves
633 as a conduit to convey the fur nearly up to that particular part of the cone which the end of the hood happened to be opposite to.

X. 69. At the time when the trunk and hinged hood are used in conjunction in the Wells machine, the hood being in such position as to cause the fur to be thrown on to the cone below a certain zone of the bat, and at the time your hinged hood was so placed as to cause the fur to be thrown below the same zone, would there be any difference in the mode of operation of the trunk and hinged hood and of your hinged hood?

A. There would be.

X. 70. What difference?

A. The trunk would go on depositing fur on zones extending to the bottom of the cone, and lower than the zones in which the hinged hood in the drawings was depositing the fur, to the extent that the trunk controlled the deposit of the fur on zones lower than were controlled by the hood; it would have a mode of operation and perform the result unlike to and unattainable by the long experimental hood that I used. That hood had a range of motion from the bottom to above the top of the former; and such range of motion was necessary in order to make a hat.

X. 71. When you say the lower part of the trunk controlled the deposit of fur on zones lower than were controlled by the hood, what part of the trunk was it that caused this different mode of operation from that when the experimental hood was used?

A. The sides of the trunk probably in their whole depth at the picker end, and for nearly their whole depth at the cone end, and also the top of it. This is my opinion on the subject, as I never tried a glass trunk.

X. 72. You say that the mode of operation of your experimental hinged hood differs from the mode of operation of the trunk and

hinged hood conjoined, as set forth in the Wells specification. Is it so?

A. It is. The experimental hinged hood had not the peculiar and characterized mode of operation of the Wells trunk. That hood, therefore, could not operate both, as the Wells trunk and the precise hood, as described in the patent, when they jointly operate upon fur.

634 X. 73. Will you please quote the words of the specification which set forth and describe the mode of operation of your experimental hinged hood as distinguished from the mode of operation of the Wells trunk and Wells hood conjoined?

A. The patent, as far as I remember, does not contain a contrast of the mode of operation of a hinged hood as distinguished from that of a hood and trunk combined.

X. 74. Then the patent contains no words describing the arrangement of a hinged hood as tried by you, nor any description in words of the mode of operation of such an arrangement?

(Objected to as a question to be answered by the patent itself and as a question of law.)

A. That position does not follow from my previous answer. The patent does not contain, as I have already stated, a description of the precise and particular experimental hinged hood used by me, but it has a statement of the mode of operation of a hinged hood, and the one used by me had the same mode of operation, differing only in extent and degree.

X. 75. Please quote the words of the patent which refer to the use of any other hinged hood than a hinged hood in connection with a trunk?

(Objected to.)

A. The only statement is in the third claim, where the hinged hood without the trunk is claimed, in connection with the picking mechanism and the former and its exhausting mechanism, to regulate the deposit of fur fibres on the tip of the former. It is not there stated, however, in terms, that the trunk is not to be used, and I do not find in the patent language to that effect.

X. 76. Do you then understand that the trunk is included as a part of the combination specified in the third clause of the claim?

(Objected to as a question of law, and not proper to be put to an expert or other witnesses.)

A. I understand exactly the contrary, namely, that the trunk is not included in that claim.

X. 77. So far as the mode of operation of your experimental hinged hood has heretofore been stated by you to be different
635 from the conjoined action of the trunk and hinged hood of the Wells patent, is not the specification silent?

(Objected to.)

A. As I before stated, the specification draws no distinction in this matter, and is therefore silent.

X. 78. Will the pervious cone, rotating brush, and lower deflector, as shown in reissue 1087, make a hat-body of the required thickness if the trunk and hinged hood be removed, and the lower deflector be

constructed and located as shown in the specification, be used in conjunction with the pervious cone and rotating brush?

A. The machine cannot so be used, for the reason that if you take away the trunk and put nothing in its place there will be nothing to support the lower deflector; but if you extend the lower deflector back to the picker-box and hinge it there, with an extent of motion at its cone end as great as the height of the cone employed, the apparatus will make a hat of the required thickness under a proper management of the lower deflector.

X. 79. Suppose the pervious cone and rotating brush be used in conjunction with a lower deflector constructed and located as described in the patent, and the hinge be supported by any projection from below at that point, would such an arrangement make a hat-body of the required thickness?

A. It would.

X. 80. How do you know?

A. Because it would be the machine just as it is now, trunk and all, with only a support for the hinge of the lower deflector, rather than and different from the bottom of the trunk.

X. 81. Suppose you then remove the trunk and hinged hood, leaving only the pervious cone, the rotating brush, and the hinged flap located and supported as described in the last question, would it make a bat of the required thickness?

A. With the hinge of the lower deflector in the exact position shown in the patent, or in pretty near that position, so as to leave a gap between the deflector and picker, and the other conditions as in the question, a bat of the required thickness could not be made.

X. 82. How do you know that a combination of a rotating
636 picker, a pervious-exhaustion former, and a lower movable deflector would make hat-bodies of the required thickness as stated by you in your 7th answer?

A. Because I tried it.

X. 83. What did you try? Describe the arrangement.

A. The picker, feeding-apron, cone, and fan were all as usual; the trunk was removed, and a flat surface composed of boards was extended from beneath the pickers, pretty nearly up to the cone; this surface was hinged below the picker and fitted with a cord and weight, so that the end nearest the cone could readily be moved up and down, or be left in any required elevation, and the picker-belt was reversed.

X. 84. What was the shape of this board? Had it sides? What was its width and size?

A. It was a parallelogram, or pretty near it. It had no sides. It was as wide as the picker, and extended from beneath the picker pretty near up to the cone.

X. 85. Describe its mode of operation in conjunction with the reversed rotation of the brush.

A. It operated to receive the fur thrown down upon it by the brush and to conduct it to that zone of the cone opposite which the deflector happened to be held.

X. 86. Was the mode of operation of this experimental lower de-

flector the same as that of the trunk and lower deflector conjoined as in the Wells specification?

A. No. It did not operate at all like Wells's trunk. It operated like his lower deflector substantially, but different in degree and extent. The precise deflector described in Wells's patent operates to control fur only on zones about the base of the cone, whereas this deflector controlled the fur deposits on all zones of the cone up to its top.

X. 87. Suppose the rotating brush had been run in the direction indicated by the arrows shown in the drawings of Wells's specification, and you had used your experimental lower deflector, would it have made a hat-body of the required thickness?

A. No.

X. 88. Quote the words of the specification which direct the construction and arrangement of such a hinged deflector as you used in your experiment.

637 A. There are none describing the precise deflector used by me.

X. 89. Quote the words which direct the reversing of the rotation of the brush.

A. There are no words directing such reversal in terms.

X. 90. What do you mean by the expression "in terms" in your last answer?

A. I mean in precise words.

X. 91. Is there anything indicating the reversing of the rotating of the brush to be used in connection with the use of a hinged deflector alone, in words of any kind, precise or not precise?

A. I think there is.

X. 92. Quote such words from the specification as indicated?

A. The indications follow from a good many words. The general directions in the patent are to run the brush, as shown by the arrow, when the trunk is used; and the words describing the machine, describes one which operates to strip fur from the brush, and direct it by throwing it towards a surface which, in the precise machine described in the patent, is the surface made by the under side of the top of the trunk. When that surface is taken away entirely, and the surface below the picker only remains, it is necessary, in order to secure the mode of operation worked out by the machine described in the patent, to run the brush in the reverse direction to that shown in the drawing, so as to throw the fibres down upon the deflector.

X. 93. Can you quote the words in the specification with no more precision than you have done?

A. No; I cannot.

X. 94. Is the mode of operation produced by the rotation of the brush in a reverse direction from that shown by the arrows, in combination with such a hinged lower deflector as you used in your experiment, set forth in the patent? and if so, quote the words.

A. The mode of operation of the deflector, in combination with a reversed brush, is not set forth in the patent.

X. 95. When you reversed the direction of rotation of the brush

638 in combination with your experimental lower deflector, had you

a hole back of and underneath the picker, to admit air between the lower deflector and picker?

A. No.

X. 96. Would this lower deflector, experimented with by you, have worked if it had not been hinged?

A. It would have worked to direct fur to the zone on the cone to which it was pointed, but it would not have operated to make a bat.

X. 97. Would your experimental upper deflector have operated to make a bat if it had not been hinged?

A. It would not, if kept stationary.

X. 98. Would either of your experimental deflectors have operated to form a bat if they had not extended from the picker to pretty near the cone?

A. In a still room, without currents of air, they would have operated without extending to very near the cone, but I can't tell how great this distance might have been, and the machine still worked. In the experiment, the upper deflector was never, I should think, more than 12 or 15 inches away from the surface of the cone, and extended from these back to the picker.

X 99. How long were the deflectors?

A. About as near as I can remember and judge, about three feet eight inches.

X. 100. When you used the lower deflector, did that board run back under the picker like the lower board of the Wells trunk?

A. It did.

X. 101. Why did you stop up the hole which is shown by the small letter "n" in the drawing below and behind the brush in these experiments with the lower deflector?

A. Because when the trunk was reversed, I knew, from previous experiments with hat machines, that it would take its air from the upper side; and that if I left the hole "n" open, that the fur would be blown backward against the feeder.

X. 102. What induced you to try these experiments with the upper and lower deflector constructed and arranged as you tried them?

A. To satisfy myself that such machine would operate to make a good hat-body.

639 X. 103. When did you try the experiments first?

A. I can't remember the day nor even the week, but it is since the testimony began to be taken in this case.

X. 104. Would either of these arrangements, such as you have experimented with, answer for practical machines?

A. I feel very certain that they would, if properly fitted and arranged in a workmanlike manner, and not as a rude experimental machine. The one with a lower deflector would have to be used in a room in which there were no great currents of air.

X. 105. Why would the lower deflector require a stiller room than the upper deflector?

A. Because it had no sides or cheek pieces; and strong currents of air blowing over it would deflect the fur from its proper course.

(The trunks and cones, with which the witness experimented, as stated in his examination-in-chief, having been brought to the ex-

aminer's office, counsel for complainant puts them in evidence as exhibits, and they are marked Exhibit J, Exhibit K, Exhibit L, and Exhibit M.)

X. 106. Do you know what was the position of the cone, "K," relatively to the trunk, "J," during the experiment of yesterday?

A. I do not know the exact relative positions of the two, not having measured it. The cone stood on the cone stand as usual, and the trunk was secured to the picker journal-boxes as usual; but how high the set screw under the trunk was set up I cannot say.

X. 107. Please state whether the position of the cone, relatively to the aperture of the trunk, was like that shown in the drawings of the patent.

A. Somewhere about that.

X. 108. Please state how the diameter of K compares at the bottom with the width of the trunk at the bottom of the cone.

A. The cone, "K," is in diameter, at the bottom at the working part, about fifteen inches. The trunk is eight inches inside width at the bottom

X. 109. Please examine the drawing annexed to reissue 1087, and state what is the width of the bottom of the trunk, and the diameter of the cone at the base.

640 A. Taking the bottom of the trunk in the drawing to be eight inches, the cone measured at the same place as Exhibit K would be about sixteen and a half inches.

X. 110. How does the width of the top of the trunk, at that point where it begins to curve, compare with the diameter of the corresponding portion of the cone in Exhibits J and K?

A. The width of the aperture or opening in the trunk, "J," where it begins to curve, is five inches and five-eighths. The diameter of cone "K," where it begins to curve at the top of the straight sides, is about nine inches.

X. 111. How do these parts compare in the drawing annexed to the patent?

Answer. They cannot be compared on the drawing, because the drawing does not give a representation of the discharge orifice of the trunk.

X. 112. Taking the whole width on the drawing of the trunk at the top, how does it compare with the diameter of the cone, part last referred to? Look at the top view of the machine shown in the drawing.

(Objected to as being too indefinite to admit of a relevant answer, as the trunk varies in width at the top at and almost innumerable number of places.)

A. Does your question refer to a measurement of the outside of the trunk?

X. 113. If you are unable to ascertain from the drawings the width of the inside, so as to make the necessary comparison, I wish you to do it from the outside.

A. I cannot make the comparison with the outside, even of the trunk, by reference to the top view spoken of, as that top view does not show where the cone begins to curve with any precision.

X. 114. Make the comparison by referring to all the views.

A. The cone shown in the drawing is about 5¾ inches in diameter where it begins to curve at the top of the straight sides. I cannot arrive correctly at the outside width of the trunk, at the corresponding point from any of the figures, but the outside of the trunk at the end nearest the cone, and three or four inches below the top, would be some five inches and a half.

X. 115. Then how did you find the width of the aperture in the trunk in Exhibit "J" to be according to the drawings
641 of the patents?

A. I have never said it was with the drawings only, but it is in substantial accordance with the drawings and specifications when a cone shaped like Exhibit "K" is used.

X. 116. What was the shape of the cone which you used in your experiments with Exhibit "J," when you used the hinged hood as stated by you in your former experiment?

A. When the hinged hood was employed to aid in directing the fibres, several different shapes of cones were used.

X. 117. Did you use the cone "K" in such experiments?

A. I do not remember whether we used the cone "K" with the hood or not.

X. 118. Take any cone where a hinged hood is necessary, in your opinion, to regulate the deposit, and tell me whether the trunk would in such case have its aperture of discharge in accordance with the direction of the patent for the construction and proportioning of the aperture of trunk relative to the cone?

A. I can answer that question best by stating what the directions are in the patent, namely, to pick out any given cone and conform your aperture to it; that aperture would be within the patent; and when cones differing much in size and shape were used, it would be necessary to use the hood. If a cone was used very different in size from that for which the aperture was made, then you could not get along with the hood and original aperture, but would have to make a new trunk with an aperture conforming to the cone last spoken of. In my understanding of the patent, it is not necessary to have exact conformity between the aperture and cone, that may be employed when the hood is used, so long as the aperture, aided by the hood, will effect the distribution on cones differing somewhat from that for which the aperture was originally proportioned.

X. 119. When you used no hood, and made a bat of the required thickness, was not the relative thickness of the bat in its several parts determined by the shape of the aperture of the discharge of the trunk?

A. It was other parts of the machine remaining in a certain relative adjustment.

642 X. 120. What part of the machine was it that was the effective agent in doing that which the hood and aperture of discharge do when the hood and aperture of discharge are used conjointly?

A. I don't understand the question.

X. 121. When the aperture of discharge is constructed to suit a

particular cone under the Wells patent, is the judgment of a skillful operative required, in forming bats on that cone, to operate the machine, as in the case where the hood is used, under the Wells patent, with another shaped cone?

A. When the hood is not used, skill is required in adjusting the parts properly before the operation is commenced, and some skill and judgment in the feeding. This latter skill and judgment is all that is required during the making of the bat, where the hood is not used.

X. 122. Is the idea that the varied thickness desired from brim to tip in the bat can be attained by means of the peculiar shape of the aperture of discharge of the trunk, without the employment of the hinged hood, set forth in the Wells patent? If so, quote the words.

A. There is a statement in the patent, that the making of the bat of the required varying thickness results from combining with a rotating, picking, and disintegrating brush, and a pervious cone or equivalent former connected with an exhausting apparatus, suitable means for controlling and directing the fur-bearing current. When the trunk and its aperture are constructed with reference to a particular cone, as directed in the patent, then the peculiar shape of the discharge aperture will effect the distribution, and is a suitable means for effecting it. I therefore think that the idea named in the question is set forth in the patent.

X. 123. Please quote the words of the patent, if any, which convey the idea that the "suitable means" for effecting the result, to wit, the required varying thickness of the bat, is the peculiar shape of the aperture of the discharge of the trunk, without the employment of the hinged hood.

A. The words conveying that idea are all that describe the construction of the apparatus as controlled and exemplified by the drawings, because the apparatus, when so constructed, will have a
643 trunk which is a suitable means for accomplishing the result.

X. 124. After describing the entire apparatus, does not this patent explicitly state that the functions of the hinged hood and the hinged deflector are to vary the thickness of the bat as required?

A. The only words that I see referring to the action of the hood and the deflector, after the description is finished, are in the claim, second and third, and there it is only stated that their functions are "to regulate the deposit of the fur fibres," "as described or as set forth."

X. 125. Do not the following words in the specification, "this deflector is hinged to the upper part of the delivery aperture of the chamber, and is connected with an eccentric, F, by means of a cord, U, that passes over a pulley, V, and which is attached to a bell crank, U 1, so that each revolution of the eccentric carries the hood up and down to direct the discharge and distribute the fibres on to the cone, a greater thickness being desirable in the parts of the bats, which form the brim than on the tip and crown; and when it is desired still further to diversify the distribution of the fibres, other means can be substituted for the eccentric, and the connection between it and the deflector is formed as represented in section at figure 5, where the cam, T, acts on the lever, T 1, connected by the cord, U," show that

the function of the hinged hood is to vary the discharge of fibres on the cone in the manner stated by the specification to be the required manner?

A. I do not think those words do state that the function of the hood is to vary the discharge in the required manner. The functions there described to the hood are, to direct the discharge, to distribute the fibres on to the cone, or to diversify the distribution of the fibres; and the hood constructed and applied to the end of the trunk, as shown in the drawings, will not of itself and without the trunk vary the discharge in the manner stated in the specification to be the required manner; the words quoted in the last question are in the body of the description, and not after the description is ended.

X. 126. Does not the specification state the function of the hinged hood to be to regulate the deposit of the fur fibre on the bat in the required manner?

A. I do not see any such statement.

644 X. 127. Does the specification convey the idea that the hinged hood has any other function?

A. Yes, as I stated in my 125th answer, which function will, if desired, effect a portion of the distribution in the required manner, or diversify the required distribution.

X. 128. Does the body of the specificatian state that the delivery aperture of the trunk, when constructed to suit a particular cone, will of itself properly distribute the fur so as to form a bat of the required thickness; if so, quote the words; I mean without the use of the hinged hood and hinged flap?

A. I have substantially answered that question in the 127th answer, where I quoted the words commencing with "results from" and ending with "current," when taken in connection with 123d answer, where I state, if the machine be constructed in the manner as described in the specification as controlled and exemplified by the drawing, then the delivery aperture of the trunk, when constructed to suit a particular cone, will properly distribute the fur to the required thickness, and be a suitable means of forming a bat of the required thickness.

X. 129. Does the patent equally set forth as the mode of operation of the Wells machine, the use of the aperture of discharge to the trunk, as the means of regulating the distribution without the hinged hood or flap, as it does the use of the trunk with the hinged flap as a means of accomplishing this result.

A. If I understand the question correctly, my answer is, that the patent, as a whole, describes a trunk aperture of discharge which will effect the required distribution, and it also describes that same aperture as acting in connection with a hood, the hood then diversifying the distribution, or in some cases, with certain sized and shaped cones, completing the distribution, which could be only partially effected by the trunk aperture; the patent, therefore, shows both the action of the trunk alone and the hood and trunk in combination.

X. 130. Is that the most direct answer you can give to my last question?

A. The last question being reread to the witness, he says he thinks it does.

X. 131. Does the drawing of the patent show any such sec-
645 tional or other view of the aperture of discharge as would enable any one to construct a machine which would, by the trunk and without the hood or flap, accomplish the formation of a hat-body of the required thickness without experiment?

A. The drawing alone does not.

(Mr. Harding says that his question is limited to the drawing, and he wishes the witness to answer in reference to the drawing only, and especially so, as there is but little time left for cross-examination.)

X. 132. In the practical manufacture of hat-bodies with the Wells machine, do you understand that the fur undergoes a preliminary picking before it is used?

A. In all the use that I have seen of the machine, the fur had been blown before it was used and was deposited on the apron in little bats, being broken pieces of the sheet of fur delivered from a blowing-machine; a blowing-machine has a picker in it.

X. 133. Do the compartments in E, E, E, in figure 1, sheet 1, of Robinson's specification, 1838, No. 6708, represent the blowing-machine substantially similar to those employed in the preparation of fur as stated by you?

A. No; the compartments are only the case of a machine.

X. 134. Does the portion of the drawing to the right of the line X, X, marked by me, represent substantially the usual blowing-machine?

A. I have often seen the usual blowing-machine in use, but have never examined it very carefully. I do not remember having seen in them any aperture under and above the feeding rollers such as is shown in these drawings, but not described in the letter-press. In other respects the drawing compares substantially with those in use, if my memory serves me right.

X. 135. Does not the fine wire-cloth E, E, E, extending above the revolving pickers D, D, D, operate as a deflector to throw the fur on to the aprons A, B?

A. If the fur was not blown backward in the hole shown in the drawing, I should think the wire would act as a deflector to a certain extent.

X. 136. In your experiment with the English or alleged Williams machine, did you use an old carding-machine?

646 A. It was a carding-machine that had marks of use.

X. 137. Was it a wool carding-machine?

A. It was, so far as I know.

X. 138. Have you ever seen a carding-machine such as were used for fur by Blanchard, by Wells, James, and Peck?

A. Never having seen the machines used by them, I cannot say whether I have or have not.

X. 139. Have you ever seen a carding-machine for fur such as exhibited in the English patent of Wells, No. 7397?

A. That machine is described as a common carding-engine, in no way altered excepting certain exceptions, such as a cover to the fancy

and a secured fancy cylinder. I have seen the common carding-engines often, but do not remember having seen one with two fancys or a cover over one of them.

X. 140. What was the deflector made of which was in front of and attached to the fan-case in the alleged English machine of Williams, with which you experimented?

A. The deflector and case on top of the fan were in one piece, and made of sheet-tin.

X. 141. Suppose a hinged deflector was attached to the front of the blower or fan-case on that machine, and moved up and down during the operation of forming a bat, what would be its effect on the deposit of fur?

A. It would have varied the deposit from the manner in which it was deposited, without such hinged deflector.

X. 142. Would it make any substantial difference in your experimental machine if the deflector in that machine was made of pasteboard instead of tin?

A. No, providing it was shaped and secured as the tin one was. I speak of the Williams machine which I saw tried.

X. 143. Did you stiffen the tin deflector in that machine, or was it stiffened in any way?

A. There were at the ends of the deflector and on top of it two small pieces of board so curved as to hold the tin deflector in the shape that it is shown as having in Williams's drawing.

X. 144. Refer to drawing, sheet 2, figure 2, now shown you, and state whether or not it represents the machine with which you experimented—the drawing taken by me from English specification No. 6387?

A Substantially, it is a side view of that machine, and represents most of its parts.

647 X. 145. Does that drawing show any small pieces of board so curved as to hold the tin deflector in shape? My question specifically relates to the drawing, sheet 2, figure 2, shown you. I will thank you to answer my question by reference to that drawing alone.

A. That drawing does not show that the deflector is to be made of tin. It merely represents a thin line showing a side view of a deflector, standing in place by its own rigidity, without any board on top to hold it in place, as it was in our experimental machine.

X. 146. Why were the boards put there?

A. To keep the tin into a curve, corresponding as nearly as could be with that shown in the drawing. It kept that shape, exactly, by itself, but was liable to get knocked out of shape.

X. 147. By what?

A. By people or things touching it, or running against it.

X. 148. What authority had you for putting those boards to stiffen the deflector?

A. They did not stiffen it, except at the extreme end. They were only about half an inch in width, and the authority I had was a desire to try the thing with a deflector, in shape and size like that shown in the patent, on the supposition that that line in the drawing repre-

sents a deflector, which I am not perfectly certain about. If the deflector had been made of hard sheet-brass it would have required no board on top.

X. 149. What is a picker?

A. A picker, in general, is anything that will pick other things to pieces.

X. 150. Does the step-piece in model B operate in the manner of a trunk?

A. What kind of a trunk?

X. 151. Any trunk?

A. It does not operate like a trunk to hold paper or clothes, if that is what you mean; but it does operate in connection with the rotating picker and exhausted cone like the trunk of the Wells machine, if that is what you mean.

X. 152. Does it operate like a trunk for conducting fur, as shown in the Williams, the Blanchard, and Miller machines?

A. Which Williams machine or Blanchard?

648 X. 153. Exhibit 18 A is the Williams machine. Thomas Blanchard's (American patent) and Hezekiah Miller's are the machines I mean.

A. In Exhibit 18, if you mean by the trunk the top-piece, the casing that covers the exhaust cylinder, that case serves to direct fur just as it leaves the picker, speaking broadly and generally, and that is one of the offices of the step-piece. In Hezekiah Miller's the top of the "oblong box" or "spout" performs the same duty as the casing in Exhibit 18 A. In the Blanchard machine, as described in his patent, the chamber or inclosure which covers the wire gauze on the carding-machine does not perform that duty, and has no operation like the step-piece in Exhibit B.

X. 154. Would you, looking at that step-piece alone and by itself, call it a trunk?

A. No, not if it was handed to me by itself.

Redirect.

Q. 155. Refer back to the answer to the 60th question, and state how you understood it at the time you made your answer to it.

(Objected to because the question and answer is perfectly explicit.)

A. I understood it to be phrased like the 59th or 61st, as asking for words which describe the precise construction used by me.

Q. 156. Do you now so understand it? and if you do not, state how you now understand it, and answer it accordingly.

(Objected to as inviting the witness to alter the testimony already given by him.)

A. I now understand it as calling for words which would convey to the mind of a mechanic instruction how to construct it, and not as calling for words describing in terms the precise construction used by me.

Q. 157. Please answer that 60th question as you now understand it?

(Objected to, as before.)

A. I quote the words commencing "and its upper," on folio 141, page 39, and ending with folio 142, and also the paragraph in
649 folio 151, page 42; these words convey to my mind the construction and mode of operation of the precise hood described by Wells, and of other hood having the same mode of operation substantially, and I certainly constructed the experimental hood that I used from the ideas conveyed to me by the patent, and, as I dispensed with the trunk, it was obvious that the hood must be hinged at the picker, knowing from Wells's description that there was to be some surface extending all the way from the cone end of the hood to the picker.

HENRY B. RENWICK.

Andrew Comstock, being recalled on the part of the complainant, this 27th September, 1861.

Q. 1. Have you to-day witnessed an experiment of making hat-bodies at the factory of the complainant?

A. I have.

Q. 2. How many were made in your presence?

A. Four or five, I should think.

Q. 3. On what were the bodies formed?

A. They were formed on cones.

Q. 4. Was the fur driven through a trunk to the cones?

A. It was.

Q. 5. With how many different trunks did you see the experiment made?

A. Two.

Q. 6. Look at Exhibits H and I, and state whether they do, or not, represent the form of the delivery apertures of the trunk respectively, which were used on that occasion?

A. They do.

Q. 7. Was any hood used on the delivery aperture in making said experiment?

A. There was none.

Q. 8. Was any other hinged piece used on the top or delivery aperture of the trunk?

A. Not in the process of forming bodies.

Q. 9. What was the quality of the bodies that were made?

A. They were of a good, fair quality.

650 *Cross-examined by Mr. Harding.*

X. 10. Where are the trunks upon which those experiments were tried?

A. They were attached to the machines at Mr. Burr's factory, corner of Cliff and Frankfor.

X. 11. Were these experiments tried on different machines?

A. They were.

X. 12. What were the trunks made of?

A. My impression is that they were of copper. I did not notice the material so much as the formation.

X. 13. Where are the cones now upon which these experiments were tried?

A. At Mr. Burr's factory.

X. 14. Who run the machine?

A. I don't know; I suppose the employés of the establishment.

X. 15. Did Mr. Dodd?

A. Mr. Dodd with others were about the forming machine.

X. 16. You are a licensee in running the Burr & Taylor machine

A. I am not, nor have not been.

X. 17. Have you ever seen it run?

A. I have.

X. 18. How did the operation of these machines that you saw experimented with this morning differ from the operation of the Burr and Taylor machine?

(Objected to as treating the witness as an expert.)

A. The principal operations were the same, I should judge, but without the hood; and the fur was not thrown on the cone as rapidly as the machines now in use.

X. 19. Why was it not thrown as rapidly as with the hood?

(Objected to as properly for an expert.)

A. I cannot tell you.

X. 20. What was the size of the cones?

A. I could not tell their hight or circumference.

X. 21. Were they taller or shorter than these apertures?

A. They were shorter.

X. 22. How far is it from here to Mr. Burr's?

A. I should think a quarter of a mile.

651 Mr. Harding requests those trunks and cones experimented with to be brought here to enable him to properly cross-examine this witness. The witness having stated that he could not describe the shape or the size of the cones; and it is necessary, to enable him to properly cross-examine this witness, that the trunks and cones be produced, Mr. Harding offering to pay all the expenses of bringing them here.

Complainant's counsel objects to lumbering the record with these notices and speeches.

ANDREW COMSTOCK.

Subscribed and sworn to before me this 27th September, 1861.

R. E. STILLWELL,
U. S. Commissioner.

Hosea O. Pierce, being recalled, this 27th September, 1861, on the part of complainant.

Q. 1. In your former examination, you stated you had recently seen hat-bodies made on a machine having a hinged hood-piece over the delivery-end of the trunk. Have you to-day seen hat-bodies formed on the same machine without such hinged hood-piece, or any other hood-piece or flap, over the delivery-end of the trunk?

A. I have; I saw three made on it.

Q. 2. What was the quality of those bodies?

A. They were of a good quality.

Q. 3. Did you on the same occasion see hat-bodies made on another machine of a different form of aperture, but without any hood-piece or flap over the aperture?

A. I did; I saw two made on that machine.

Q. 4. What was their quality?

A. Good merchantable hat-bodies.

Q. 5. Look at Exhibits H and I, on the part of the complainant, and state whether those exhibits do or not represent the shape and size of the delivery-apertures of the trunks respectively which were used in these experiments?

A. They do.

652 Q. 6. Who were present when these experiments were made?

A. Mr. Starr, Mr. Comstock, the two Mr. Renwicks, and others.

H. O. PIERCE.

Subscribed and sworn to before me this 27th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Samuel G. Starr, being recalled on the part of the complainant, this 27th September, 1861.

Q. 1. You stated, on your last examination, that you had recently seen hat-bodies formed on a machine with a hinged hood-piece over the delivery-end of the trunk. Have you to-day seen hat-bodies formed on the same machine without such hinged hood-piece, or any other hood-piece or flap, over the delivery-end of the trunk?

A. I have; I saw three bodies formed on it.

Q. 2. What was their quality?

A. They were formed very well.

Q. 3. Did you on the same occasion see hat-bodies made on another machine of a different form of aperture, and without any hood-piece or flap over the aperture?

A. I did; I saw two or three bodies made on such other.

Q. 4. What was their quality?

A. They were very superior.

Q. 5. Where were those bodies made, and who were present?

A. At Mr. Burr's factory; there was present Mr. Andrew Comstock, H. O. Pierce, Mr. Burr, the two Mr. Renwicks, and others.

Q. 6. Look at Exhibits H and I, and state whether they do or not represent the form and size of the delivery-apertures respectively of the two trunks used in making said hat-bodies?

A. They do.

Q. 7. Which one exhibits the aperture of the trunk with which you had before seen a hinged hood used, as before stated?

A. The one marked letter H.

SAMUEL G. STARR.

Subscribed and sworn to before me this 27th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

X. 13. Where are the cones now upon which these experiments were tried?

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X. 14. Who run the machine?

A. I don't know; I suppose the employés of the establishment.

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A. Mr. Dodd with others were about the forming machine.

X. 16. You are a licensee in running the Burr & Taylor machine

A. I am not, nor have not been.

X. 17. Have you ever seen it run?

A. I have.

X. 18. How did the operation of these machines that you saw experimented with this morning differ from the operation of the Burr and Taylor machine?

(Objected to as treating the witness as an expert.)

A. The principal operations were the same, I should judge, but without the hood; and the fur was not thrown on the cone as rapidly as the machines now in use.

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U. S. Commissioner.

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H. O. PIERCE.

Subscribed and sworn to before me this 27th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

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Q. 7. Which one exhibits the aperture of the trunk with which you had before seen a hinged hood used, as before stated?

A. The one marked letter H.

SAMUEL G. STARR.

Subscribed and sworn to before me this 27th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

SEPTEMBER 28*th*, 1861.

Charles O. Jessup, being called on the part of the complainant, deposes and says:

Q. 1. What is your name, age, residence and occupation?

A. Charles O. Jessup, age 39 years, reside at Newark, New Jersey, and am an iron-founder now, but a hatter by trade; formerly was employed by St. John, Burr & Co., and was the mechanic in getting up and experimenting on the Taylor machine.

Q. 2. Did you ever harden hat-bodies whilst held on the cone by the exhaust, by means of an outside cone which was not perforated, but impervious to air?

A. I have.

Q. 3. How often have you done so, and with what success?

A. During the course of experiments which I made in 1855, that, among others, I accomplished in Mr. Taylor's factory in Hague street, New York.

Q. 4. In what manner was such hardening done, and what was the mode of operation?

A. The manner it was done was by a cover or outer cone, such as Mr. Burr now uses, and always has, since I have known anything about the machine, by taking off the upper flange as it spreads out, and making a solid tip out of tin or zinc metal, and inlaying the lower portion where the perforations are with fine hardware paper, pasting it in, making it perfectly smooth; then by having an inner cone, on which the bat was formed, from three to five inches smaller in diameter, by putting it on to the cone and bat; this cover, and by hardening it with my hands on the outer cover while revolving.

654 Q. 5. State whether any conformity of the shape or lines of the outer cone to those of the inner was observed in the construction; if so, what conformity?

A. There was a conformity; the outer and inner cones were so constructed that would it bear on the whole line from the edge of the cone to the square or near the tip, that is, on the upper side of the cone, as the cones were lying or fastened upon the machine in a horizontal position, as described in the Taylor patent.

Q. 6. What was the object of there being a uniform bearing in this whole line of contact?

A. So that when the outer cone was vibrated it would press or bear equally upon the upper surface of the bat.

Q. 7. In what manner did you place the outer cone upon the inner one in bringing it to it, when the bat was on the inner cone?

A. By carefully carrying it on true with the space all around the inner cone until it came to the tip of the inner cone, and then letting it fall.

Q. 8. In this way could you and did you harden hat-bodies without injuring the body?

A. I did harden merchantable hat-bodies in that way.

Q. 9. You were assisting Mr. Taylor in these experiments?

A. Yes, I was.

Cross-examined by Mr. Harding, counsel for defendants.

X. 10. What made you take all this care in putting on the perforated cone, with the paper lining to the bat, in your experiment?

A. It was necessary to put it on, and leave a space between the bat and the cover, to have the bat remain in place at the edge or brim.

X. 11. How do you know that it was necessary to exercise that care, in order to have the bat remain in place?

A. Because if it was not put on carefully, it would draw up from the edge.

X. 12. Why would it draw from the edge, and where would it draw to?

A. If the cover touched the upper side of the bat, and the fur would then draw over or up from the edge; or, in other words, if the
655 outer cone or cover was put on carelessly, so that it would touch in different places, it would change the bat or fur by rolling up, or drawing up from the edge towards the tip.

X. 13. Is not this result produced by the air passing up between the bat and the cover, to enter the vacuum at the upper part of the cone?

(Objected to.)

A. I do not profess to be an expert, but I am stating what I done in experimenting and by observation.

X. 14. Question repeated.

(Counsel for complainant objects to the question being repeated to the witness after the answer he has given.)

A. It is necessary, as I have stated in a former question, in putting on this outer cover, that it should be carried on true, and leave an opening between the bat and cover until it is carried up to the point desired; the cover only bears upon the bat in a narrow straight line from the base to the curve or set-off of the cone; the tip of the bat I hardened with the end or the tip of the cone after the bat was hardened upon the sides?

X. 15. How was the bat hardened upon the sides?

A. By placing my hands upon the outer cover and giving it a gentle reciprocating motion.

X. 16. What made the fur roll up when the side of the cover touched the bat in putting it on?

(Objected to.)

A. The first set of cones that we tried that experiment with, of putting on a solid cover, caused the fur to roll up all around the edge, because, as we believed, that the air drew it up by rushing in between the bat and cover. We then had a smaller set of cones made, and we made some hat-bodies upon them with this same cover, which were merchantable hat-bodies.

X. 17. Question repeated.

(Objected to.)

A. I believe I have answered that, by the explanation I have given in the different sizes of cone that we adopted.

X. 18. What made you try this experiment?

A. This particular one?

X. 19. What made you try the experiment to which you have given your answers-in-chief?

A. The reason why we tried this experiment with the paper
656 inside the cone was, while hardening the bat with the large perforators in the cover, that the fur worked up in the manipulations—a jiggering motion—the fur worked up around these holes and made an imperfect hat-body. We thought to obviate that by putting in this stiff paper, by pasting it inside of the outer cover.

X. 20. How came you to try this experiment?

A. I was in Mr. Taylor's employ, in Newark, as agent for him, and I had suggested to him the drawings for a bat machine that I had contemplated putting in operation. Mr. Taylor suggested making it into a hat-body machine, and went in and so constructed it, and I assisted in all or nearly all the experiments, I being a practical hatter, and had to judge of the quality of the work.

X. 21. Did you first suggest the idea of jiggering a conical cover on the bat for hardening it?

(Objected to, because no defense is set up in the answer under which the evidence sought is competent or admissible, and it is not a cross-examination to any points inquired of in the direct examination.)

A. I cannot say that I did first suggest it.

X. 22. Where did you get it from?

(Objected to, for the same reasons.)

A. I learned the principle of hardening bats, in 1838, by hand, that needed a rubbing motion, when I first went to learn my trade, but I did not learn it on a former. Where I first got the impression or the idea from was in the factory in Hague street, Mr. Taylor's factory. Whether I suggested that particular kind of motion, or Mr. Taylor, I cannot say.

X. 23. What was the result of your experiment with the paper inside of the cone, in your mode of working the machine practically?

A. As I stated before, that with the large cone, it caused the fur to draw up from the edge, and with the smaller cone, that it required to be put on very carefully, and as we were trying various experiments to find out the best, we then tried the smaller perforators, and found less difficulty than with any of the others. We tried many other experiments than those spoken of.

657 X. 24. Who first suggested this experiment mentioned in your examination in chief?

(Objected to, for the reason stated in objection to the 21st question.)

A. I think Mr. Taylor did, after I had hardened some with the cover with large holes in; at all events he had the paper cut out and pasted in when I came the next day.

X. 25. Why did you not adopt this mode of hardening after the experiment?

A. For the reason stated before, that the perforated cover was much easier to put on the bat and did not require so much care.

X. 26. When did you try the experiments with the smaller perforators?

A. Soon after we had the smaller sets of cones made, by putting on one of the larger cones to the smaller.

X. 27. Was it before or after your paper experiment that you tried the smaller perforators?

A. We had the smaller cones made to try the solid cover. We then, after trying that, put the larger cone that we had previously on to the smaller cone.

X. 28. Question repeated.

A. Afterwards.

X. 29. Did you ever have a solid cover made?

A. No.

X. 30. How many bats did you make with a paper cover?

A. I can't say how many. We were trying a series of experiments, and that one was among the rest.

X. 31. Can you give me no idea?

A. Not positively. I recollect of taking two to Newark to show to some parties there.

X. 32. What was the diameter of the small cone on which you tried the experiment?

A. I could not state positively. I should think about twenty inches at the base.

X. 33. Why did you not reduce this solid cover into practical operation with the machine?

(Objected to, as a repetition of a question already put and answered, and not competent.)

658 A. For the reason stated, that it was more difficult to put it upon the bat than a perforated cone or cover.

C. O. JESSUP.

Subscribed and sworn to before me this 28th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Lucius E. Rockwell, being recalled on the part of the complainant, this 28th September, 1861.

Q. 1. You have stated, when examined before, that an old machine came to Mr. Burr's factory from Duryee, Jaques & Co., and a new one was sent out in place of it. State whether, whilst you have been in the employment of Mr. Burr or of the firm of H. A. Burr & Co., any other machine than the one referred to has been returned by or has come from Duryee, Jaques & Co., or Rankin, Duryee & Co.?

A. Not to my knowledge.

Q. 2. Would you have been likely to know it if another had been returned or come from them?

A. I should.

Q. 3. Why?

A. Because I am there all the time, through the building, receiving and discharging all machinery that comes in or goes out.

Q. 4. Are you or not familiar with all the machinery in the establishment?

A. I am.

Q. 5. How much have you been absent since you first went into the employ of Henry A. Burr or Henry A. Burr & Co.?

A. Not a full day, with the exception of holidays, and with the exception of last March, some seven or eight days, when my father died.

Q. 6. What is your position in the establishment?

A. Foreman of machinery.

Q. 7. In the machine which was returned by Duryee, Jaques & Co., state whether the platform or turn-table for the cone to stand on was a large one or a small, or what size?

659 A. On the machine that was returned there was a small one.

Q. 8. Was the machine any different from the ordinary machine used in Mr. Burr's factory?

A. Nothing more than the shape; a little stronger or heavier.

Q. 9. I mean the machine that was returned—not the machine that was sent.

A. There was no difference from Mr. Burr's in his factory.

(The witness stated what is contained in his last answer before the last question was put.)

LUCIUS E. ROCKWELL.

Subscribed and sworn to before me this 28th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

Charles St. John recalled, on the part of the complainant, this 28th September, 1861.

Q. 1. Were any hat-body forming machines, if so how many, furnished by your firm to Rankin, Duryee & Co., pursuant to the agreement dated November 7th, 1848?

A. There was two.

Q. 2. At what time were they respectively furnished?

A. As near as I recollect the one was in September or October, preceding the other in December, following the date of that agreement.

Q. 3. Were any other hat-body forming machines ever furnished by the firm of St. John, Burr & Co., or their successors, Henry A. Burr & Co., or Henry A. Burr to Rankin, Duryee & Co., or Duryee, Jaques & Co? If so, how many, and when?

A. There was one sent in exchange for an old one in the commencement of 1858; none other to my knowledge.

Q. 4. Was the last-named machine sent before or after the return of that for which it was exchanged?

A. It was sent after.

Q. 5. How soon after?

A. Well, almost immediately, within two or three days, I think.

Q. 6. Was any other hat-body forming machine than the
660 one which was so returned in exchange ever returned by Rankin, Duryee & Co., or Duryee, Jaques & Co., to St. John, Burr & Co., Henry A. Burr & Co., or Henry A. Burr?

A. Not to my knowledge.

Q. 7. Would you have been likely to know it if there had been?

A. I should.

Q. 8. Was any part of a machine ever returned, other than the one so returned in exchange as above stated?

A. I don't know that there was.

Cross-examined by Mr. Parker, counsel for defendants.

X. 9. When did you leave the firm of St. John, Burr & Co.?

A. I think it was in 1856.

X. 10. What knowledge had you as to what machines they sold or supplied after the ceasing of your connection with them?

A. I was at the factory almost daily, having work done, and happened to be there the day this one machine was brought back.

X. 11. How do you know that it was in exchange for one furnished?

A. The party that brought it on the wagon said that that was an old machine, and he wanted to get the other one in the place of it; but it wasn't ready, and he didn't get it that day I believe—I believe not that day.

X. 12. How do you know that they ever got it?

A. I don't know that I saw the new one delivered; I am not certain that I did.

X. 13. Do you know that the one brought came from Duryee & Co., otherwise than from hearsay?

A. I only know it by its being delivered as I have stated; I didn't see it put on at their place.

X. 14. Your knowledge is briefly this, if I understand you, that some man bought a machine, and said, in your hearing, that he wanted another. Is that all?

A. So far as it concerns that machine, it is Mr. Jaques had several conversations with me, with reference to changing that machine previously, and complained of Mr. Burr being so slow in getting
661 this new machine done, and they didn't get it as soon as they wanted to. Of course when this machine came I supposed that was it. [I spoke to Mr. Burr, and asked him why he didn't get it ready, and he said it had been done for some time, and that the old one for exchange was not forthcoming. He shouldn't send it till that came.]

(Objection taken to all the answer in brackets.)

X. 15. Were your visits at the factory after January, 1858, daily, or merely accidental?

A. Almost daily.

X. 16. For what purpose?

A. I had work done there, and I went to see about it.

X. 17. Do you know whether any of the licensees of Burr & Co. built their own machines?

(Objected to.)

A. Not that I know of.

X. 18. Did not Aaron Peck and Israel D. Condit?

(Objected to.)

A. I don't know whether they had that privilege or not.

Direct resumed.

Q. 19. When the man came with the machine on the wagon as stated, did he state where it came from; if so, what did he state in that respect?

(Objected to.)

A. I have answered, that he said there was an old machine from Duryee & Jaques—I think he said Duryee & Jaques—and that he wanted to get a new one for it.

CHARLES ST. JOHN.

Subscribed and sworn before me, this 28th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

William Murdock, being sworn on the part of the complainant, this 28th September, 1861.

Q. 1. What is your name, age, residence, and occupation?

A. William Murdock, thirty-seven years of age, reside in New York, and am a machinist.

662 Q. 2. Who do you work for, and how long have you worked there?

A. Mr. Burr, for six years.

Q. 3. State whether you at any time helped unload an old hat-body machine brought to the factory, and represented to be from Newark.

A. Yes, I did.

Q. 4. Who helped you unload it?

A. Mr. Rockwell was along there, and helped me.

Q. 5. About when was that?

A. About the beginning of 1858.

Q. 6. State whether that was the only one you helped unload coming from Newark.

A. Yes.

Cross-examined by Mr. Parker, counsel for defendants.

X. 7. How many men were there in your factory at that time?

A. In the machine shop, I think there was four or five. I can't mind which.

X. 8. How many about the establishment?

A. I don't know that. I don't keep the men's time in the establishment.

X. 9. I suppose you used to see them. Tell us about how many you should judge there were.

A. I have no idea.

X. 10. As many as forty?

A. Well, I don't know; I never counted them.

X. 11. Were there not as many as that?

A. I have given my answer. I don't know how many there was.

X. 12. Have you been present in this room during the examination of the last witness, Mr. Brown?

A. A little while; about an hour.

WM. MURDOCK.

Subscribed and sworn to before me, this 28th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

663 James M. Riblet, being sworn on the part of the complainant, this 28th September, 1861.

Q. 1. What is your name, age, residence, and occupation?

A. James M. Riblet, 45 years of age, reside in New York, and am a clerk.

Q. 2. Are you the Mr. Riblet who was once interested in hat-body machines with Mr. Burr?

A. I am.

Q. 3. State how long you have been with Mr. Burr as partner or otherwise.

A. Ever since 1852.

Q. 4. Do you know of an old hat-body machine being returned from Duryee, Jacques & Co. to Mr. Burr's place?

A. I do; and on the same day a new one went out, if my memory serves me right.

Q. 5. About when was that?

A. It was on the 27th day of February, 1858, I think. It was near that at all events.

Q. 6. State whether or not that was the only machine that you know of having been returned by the defendants.

A. There was only one machine returned.

Q. 7. State whether or not you was so situated there that you would have been likely to have known if more than one had been returned.

A. I was.

Cross-examined by Mr. Parker, counsel for the defendants.

X. 8. Is the date you have mentioned that of a charge for a machine sold?

A. It is.

X. 9. When did you see it?

A. I charged it myself, and saw the charge yesterday.

X. 10. What was your situation in the establishment?

A. I was a partner in the concern.

JAMES M. RIBLET.

Subscribed and sworn to before me this 28th September, 1861.

R. E. STILWELL,
U. S. Commissioner.

664 We, United States commissioners, duly appointed by the circuit court of the United States for the southern district of New York, do hereby certify that the foregoing depositions were taken before us in pursuance of the stipulation hereunto attached.

KENNETH G. WHITE, [L.S.]
RICHARD E. STILWELL, [L.S.]
U. S. Commissioners,

Duly appointed by the circuit court of the U. S. for the southern district of New York.

NEW YORK, *September* 30, 1861.

665 *The United States Patent Office to all persons to whom these presents shall come, greeting:*

This is to certify that the annexed is a true copy from the records of this office of letters patent granted to Henry A. Wells, James James, and Robert W. Peck, Sept. 20, 1837. Improvement in machinery for making bodies to hats of fur.

In testimony whereof, I, D. P. Holloway, Commissioner of Patents, have caused the seal of the Patent Office to be [L. S.] hereunto affixed this seventh day of August, in the year of our Lord one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-sixth.

D. P. HOLLOWAY, *Commissioner.*

No. 383.

The United States of America to all to whom these letters patent shall come:

Whereas Henry A. Wells, James James, and Robert W. Peck, of Brooklyn, N. Y., have alleged that they have invented a new and useful improvement in machinery for making bodies to hats of fur, which, they state, has not been known or used before their application; have made oath that they are citizens of the United States; that they do verily believe that they are the original and first inventors or discoverers of the said improvement, and that the same hath not, to the best of their knowledge and belief, been previously known or used; have paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose:

These are therefore to grant, according to law, to the said 666 Henry A Wells, James James, and Robert W. Peck, their heirs, administrators, or assigns, for the term of fourteen years from the twentieth day of September, one thousand eight hundred and thirty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said

Henry A. Wells, James James, and Robert W. Peck, in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

[L. S.] Given under my hand at the city of Washington, this twentieth day of September, in the year of our Lord one thousand eight hundred and thirty-seven, and of the independence of the United States of America the sixty-second.

JOHN FORSYTH,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.

HENRY L. ELLSWORTH,
Commissioner of Patents.

THE SCHEDULE REFERRED TO IN THESE LETTERS PATENT, AND MAKING PART OF THE SAME

Specification of improvements in forming fur hat-bodies by machinery, the same being the joint invention of Henry A. Wells, James James, and Robert W. Peck.

To all persons to whom these presents shall come:

Be it known that we, Henry A. Wells, James James, and Robert W. Peck, all of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful improvement in the machinery for making bodies to hats of fur, from a delicate web of fur, and that the following is a full and accurate
667 description of the construction and manner of operating said improved machine, as jointly invented by us. Fig. 1 is a front, and Fig. 2 an end view thereof This machine consists of a frame, A, A, A, six feet three inches long, and fourteen inches wide, and nineteen inches high, supported by legs five inches inwards from the corners, and marked A^1, A^1. On the outside of each top plate A^2, A^2, is screwed a piece of plate iron 1, 1, the upper edge rising half an inch, which forms a railway for the traversing carriage hereafter described; and at each end of the frame, a stud, A^3, A^3, is bolted, extending to the floor, and rising one foot above the top of the frame; and at the pulley or driving end, a second stud, marked H, is raised two feet three inches, six and a half inches from the stud on that end to which it is connected at the top, leaving a space of six and a half inches between the studs; at seven and a half inches, these studs receive the bearing of the driving-shaft marked I, to which it is secured by caps in the usual way; this shaft has on it a driving pulley J, twelve inches in diameter, having on its outside a scored clutch connected with it, which pulley, being loose upon the shaft, is moved easily endwise upon it. Upon the inner face of this pulley are the clutch-pins 2, 2, to catch the arms upon the pinion next described. This pinion, marked L, has usually sixteen cogs, and is fast upon the shaft, and has bolted to it two arms, marked K, K, extending outwards

from the center about three inches, in such a manner that when the pulley advances towards them, the pins in the pulley will be brought against the arms, and the pinion and shaft will be carried round with the pulley. On the stud H, on the pulley end of the frame, and eight inches from the floor, are the boxes for the main shaft of the machine, marked B, which at the other end is sustained by a girth connecting the middle legs at the same distance up from the floor. This shaft has upon its pulley end a spur cog-wheel, marked M, with say ninety cogs, gearing into the pinion L, and on the other side of the stud a pulley, ten inches in diameter, marked N, which may be one and a half inches on the face. Ten and a half inches from the pulley is a bevel pinion, marked G, with say twenty-two cogs; and near the inside bearing in the middle girth it has a similar pinion of the same number of cogs, and marked E. A carriage is then formed
668 with two axles with four scored wheels T, T, ten inches in diameter, and adapted to travel on the railway before described. These are attached to and connected by a board 3, 3, two feet ten inches long. End pieces, U, U, are raised from the ends of this board; they may be nineteen inches high and ten inches wide. These end pieces are supported by a connecting piece of board 4, 4, fastened on their front edges. A horizontal board 5, 5, fig. 2, is connected with the bottom edge of the supporting board; it projects five inches beyond the back of this board, forming a shelf to support the web to be formed into hat-bodies. On each end board, at the top, there are two standards or arms 6, 6,—7, 7, fig. 2, to receive the bearings of two rollers, marked Y and Z, which rollers are covered with cloth, and are to carry over the web, so that when the rollers, which are two inches in diameter, are placed upon the standards or arms, they will be in a line with each other, and may rise from five to seven inches higher than the top of the end-board; and other similar rollers, as 8, 8, may be added, if thought necessary, to carry over and regulate the web. To the under side of the carriage board 3, 3, is bolted a piece of hard wood *b*, *b*, three feet long, one and three-quarters of an inch wide, and one and a half inch thick, scored or grooved on the under side, the groove being half an inch wide and half an inch deep; the center of this piece is placed at right angles with the board, and midway between its two ends. An upright shaft, V, is placed in the center of the frame, having its step in a girth connecting the middle legs, three inches from the floor, and its upper bearing in the middle of the upper girth, and being bolted to the plates of the frame on the top; upon this shaft is a bevel-wheel, marked D, with say eighty-eight cogs, gearing into the pinion on the end of the main shaft, marked E. On the top of this shaft V, above the bearing, is an arm *g*, nineteen inches long. It has a slot through it five inches long to allow the shifting of the pin *g*, which pin rises half an inch above the arm, and enters the groove in the piece of hard wood *b*, *b*; the revolution of the shaft V will then give a vibratory motion to the carriage, upon the end of the carriage towards the pulley; near the bottom of the end
669 board U is a guide, *a*, *a*, which embraces a sliding pulley a^1, a^1; this guide may project three inches and a half outward, and extend six inches upwards, leaving a space between of two inches for

the scored sliding pulley a^1, a^1. A shaft half an inch square, marked b^1 b^1, having its bearings in the upright pieces A^3, A^3, at the end of the frame, stands ten and a half inches above the plate 1, 1; this shaft has on one end a pulley R, of three and three-quarter inches in diameter, standing immediately over and connected by a band with the pulley N. This square shaft passes through the sliding pulley a^1, a^1, which has three scores or grooves; the first three inches, and the last four and a half inches in diameter; and it is so fitted as to slide easily on the shaft, and to take its motion from it. The shaft passes through holes in the end-boards of the carriage in which holes it plays freely, below the shelf or bottom 5, 5. A pulley *c*, *c*, is placed on the end of the roller Z, or the roller Y, which is to be scored like the sliding pulley, the smallest diameter one and a half inch, and the other to correspond with the sliding pulley. The pulley *c*, *c*, is connected with its corresponding roller by a band 10, 10, fig. 1, on the opposite end and with other rollers, if added.

When the pins 2, 2, on the driving-pulley J, are brought into contact with the arms K, K, on the pinion, and the machine is caused to operate, the main shaft, B, will thereby receive its motion; the pulley N will communicate motion to the square shaft b^1, b^1, which will set the top-rollers Y, Z, in motion, the pinion E will give motion to the upright shaft V, and the pin in the arm *g* will cause the carriage to traverse to such a distance on the railway as its situation on the arm may determine, which distance may be regulated at pleasure. The carriage being thus caused to pass forwards and backwards on the railway, the top-rollers will continue in motion, as the sliding-pulley will be caused to slide on its shaft with the carriage, and will always by means of the guide *a*, *a*, be kept in a vertical line with the pulley on the top-roller which it drives. The foregoing pieces of machinery complete the motion for traversing of the carriage. But as it is necessary that the cone, upon which the web is to be wound, should have a rotary motion, and also be caused to vibrate, the following machinery is added. The conical former, shown separately in fig. 3, but well known in hat-making machinery, and seen endwise at 11, fig. 2, is mounted upon a standard in front of the above-described machine. The two plates, *u*, *u*, represent the top and bottom of this standard, which may consist of triangular plates of cast-iron, measuring fourteen inches on each side, separated by three studs, b^{11}, b^{111}, twenty-two inches long, at the respective angles. And in the center of these is an upright shaft, *d*, *d*, having its step in the lower piece, and a bearing in the top piece. This triangular, or other formed frame, is placed in front, and opposite to the middle of the traversing carriage, or railway, and say twenty-four inches from it, with one angle and stud directly in a line with the upright shaft V, in the traverse frame, as shown in fig. 2, in the end view; this stud b^{111}, has in it the bearing of a pinion-shaft, 12, which has its other bearing on the middle leg, A, 4, of the railway frame. On this shaft is a pinion, marked W, with say twenty-two cogs, gearing into the large wheel, D, on the upright shaft, V, of the railway frame; and on the other end of it has a bevel-wheel, marked V^1, with, say seventy-five cogs gearing into the lower pinion, X, of the shaft in the triangu-

670

lar frame, and having, say twenty teeth. A vibrating frame is formed to sustain the conical former, which is shown separately in fig. 3. The lower piece of this frame is marked S, and may be three inches square and five feet long; this piece of wood has a hole in the center to receive the top of the upright shaft *d*, *d*, a small distance above the triangular piece of casting, *u*, having a washer, 13, three inches in diameter, between the wood and the iron on which its vibrates. Upon each end of this piece of wood upright pieces of wood are raised, marked S^1, and connected by a girth, S^{11}, at three and a half inches up from the bed piece; above which the uprights S^1 rise sixteen inches; and the one of them has an iron bearing, marked a^2, (figs. 1 and 3,) to receive the shaft of the cone, and having the bearing for said shaft open at top, to admit the cone-shaft to be taken away, and a new one substituted. This bearing receives the shaft of the cone fourteen inches up from the girth; at the same distance from the girth, the upright on the pulley end has a pulley, marked b^2, with its bearing resting in the upright piece, and sustained at the other by a stand projecting outward, marked C, (figs. 1 and 3,)
671 with a pulley, b^2, say four inches in diameter, fastened on the shaft which it carries. The inside end of this shaft has a square socket, at a^3, which receives and turns the cone-shaft, the upright S^1 serving as a collar in which the shaft of the pulley b^2 revolves; the upright piece on this end also (14) extends downwards from the bed-piece seven inches, and receives the shaft, marked *f*, *f*, which communicates motion to the pulley last described; this shaft has a pulley, marked Q, of the same size, and in a line with the upper pulley, and on the other end, a cog-wheel, marked g^1, g^1, with, say seventy-five cogs, gearing into the pinion, marked *m*, on the top of the upshaft; the bearing sustaining this shaft on the other end is in a thimble clasping the upright and resting on a shoulder turned upon the shaft; this thimble, marked *h*, *h*, (figs. 2 and 3,) caused to turn with the vibrating carriage by a brace connected with the thimble, and extending towards the other end of the vibrating frame. By connecting the two pulleys with a band, the cone when entered in place will have a rotary motion; but, as this frame must also have a vibrating motion, so as to properly distribute the web, a third upright shaft, marked I^1, is placed, say sixteen inches from the traverse frame, and nineteen inches from the pulley end; the step is screwed to the floor, and the upper bearing projects forward from the plate of the railway; this shaft has on it a miter-wheel, marked *w*, say with thirty cogs, and is connected with the main shaft by a horizontal shaft having on the front end a match miter-wheel, and on the other a bevel-wheel, marked F, (fig. 2,) with, say eighty-eight cogs, gearing into the pinion described first on the main shaft. The upright rises above the upper bearing three and a half inches, and has an arm, marked *j*, nine and a half inches long, and slotted, say five inches, forming a crank. To the back side of the vibrating-frame, an iron arm, i^2, i^2, is bolted to communicate the vibratory motion to the frame, the joint-piece h^2, h^3, connecting it with crank-arm *j*. The connecting-piece h^3, h^3, is bent downwards, say two and a half inches, as seen at h^3, to clear the piece *u*, already described; when it is again turned hori-

zontally, lying level with the crank, this horizontal part has six or eight holes by which it is connected by a stud or pin *k*, to the crank *j*, through the slit; and by a proper arrangement of this pitman
672 and desirable vibrating motion is obtained, suitable to the cone to be covered. But as it is of great importance that steam should be applied while the bodies are being formed on the cone, a sufficient quantity should be taken from a boiler and conducted through a pipe placed close by the back stud of the triangular frame, which pipe turning over the center of the upright enters the lower end of a cock, marked O, which rests on a stand marked *z*, bolted to the top triangular piece and projecting over the bed-piece of the vibrating-frame, where it is made circular and sustains the cock, and a pipe which passes from its upper end up through the girth, where it is connected with a tin tube, *s*, *s*, made slightly circular to conform to the shape of the cones; this pipe has a joint, marked *p*, above the cock and below the girth, to which the top-piece is screwed, above which it enters the said bent tin pipe, which is perforated with small holes and is formed slightly circular, and may be wound with cloth to prevent a too great action of steam upon the web; the cones are made of tin of the shape and size desired for the bodies, and they are covered with wolen cloth, with a score *t*, *t*, in the middle, for the convenience of cutting the bodies apart; it is formed on a half-inch shaft made to fit the socket at the pulley end, and a bearing to fit the other end, and for the convenience of carrying off the condensed water, a tin trough, 15, 15, may be placed under the tin tube, and the water carried to a pail by a leaden pipe; similar pipes and conveniences must be brought under the cone where the hardening process is going on, for the introduction of steam to the bodies while the hardening is being done. All those pipes through which the steam is brought must have stop-cocks in them to regulate the steam; and for the more perfect explanation of our said machine, we have hereunto annexed two sheets of drawings representing the several parts of our machine distinguished from each other by letters of reference.

The above machinery combined and brought to operate as above set forth is our joint invention, and the result of many laborious and expensive experiments.

We do not claim as our invention any of the parts of said machines or machinery or motions separately and independently of their
673 connection in the machinery and the combinations herein described, but we do claim as our invention and improvement, and as new and useful, the above arrangement and combination of the parts of said machinery in manner as above described, or in any other manner substantially the same, which combination consists essentially in the producing the transverse vibratory and rotary motion as one action, so as that by winding upon cones a web of fur, and by the application at the same time of steam, in manner above described, and connected with the other operations provided for by the said machinery to form and harden a hat-body, and prepare the same for the sizing operation in a manner much easier, better, and more expeditious and

lar frame, and having, say twenty teeth. A vibrating frame is formed to sustain the conical former, which is shown separately in fig. 3. The lower piece of this frame is marked S, and may be three inches square and five feet long; this piece of wood has a hole in the center to receive the top of the upright shaft *d*, *d*, a small distance above the triangular piece of casting, *u*, having a washer, 13, three inches in diameter, between the wood and the iron on which its vibrates. Upon each end of this piece of wood upright pieces of wood are raised, marked S^1, and connected by a girth, S^{11}, at three and a half inches up from the bed piece; above which the uprights S^1 rise sixteen inches; and the one of them has an iron bearing, marked a^2, (figs. 1 and 3,) to receive the shaft of the cone, and having the bearing for said shaft open at top, to admit the cone-shaft to be taken away, and a new one substituted. This bearing receives the shaft of the cone fourteen inches up from the girth; at the same distance from the girth, the upright on the pulley end has a pulley, marked b^2, with its bearing resting in the upright piece, and sustained at the other by a stand projecting outward, marked C, (figs. 1 and 3,)
671 with a pulley, b^2, say four inches in diameter, fastened on the shaft which it carries. The inside end of this shaft has a square socket, at a^3, which receives and turns the cone-shaft, the upright S^1 serving as a collar in which the shaft of the pulley b^2 revolves; the upright piece on this end also (14) extends downwards from the bed-piece seven inches, and receives the shaft, marked *f*, *f*, which communicates motion to the pulley last described; this shaft has a pulley, marked Q, of the same size, and in a line with the upper pulley, and on the other end, a cog-wheel, marked g^1, g^1, with, say seventy-five cogs, gearing into the pinion, marked *m*, on the top of the upshaft; the bearing sustaining this shaft on the other end is in a thimble clasping the upright and resting on a shoulder turned upon the shaft; this thimble, marked *h*, *h*, (figs. 2 and 3,) caused to turn with the vibrating carriage by a brace connected with the thimble, and extending towards the other end of the vibrating frame. By connecting the two pulleys with a band, the cone when entered in place will have a rotary motion; but, as this frame must also have a vibrating motion, so as to properly distribute the web, a third upright shaft, marked I^1, is placed, say sixteen inches from the traverse frame, and nineteen inches from the pulley end; the step is screwed to the floor, and the upper bearing projects forward from the plate of the railway; this shaft has on it a miter-wheel, marked *w*, say with thirty cogs, and is connected with the main shaft by a horizontal shaft having on the front end a match miter-wheel, and on the other a bevel-wheel, marked F, (fig. 2,) with, say eighty-eight cogs, gearing into the pinion described first on the main shaft. The upright rises above the upper bearing three and a half inches, and has an arm, marked *j*, nine and a half inches long, and slotted, say five inches, forming a crank. To the back side of the vibrating-frame, an iron arm, j^2, j^2, is bolted to communicate the vibratory motion to the frame, the joint-piece h^2, h^3, connecting it with crank-arm *j*. The connecting-piece h^3, h^3, is bent downwards, say two and a half inches, as seen at h^3, to clear the piece *u*, already described; when it is again turned hori-

zontally, lying level with the crank, this horizontal part has six or eight holes by which it is connected by a stud or pin *k*, to the crank *j*, through the slit; and by a proper arrangement of this pitman
672 and desirable vibrating motion is obtained, suitable to the cone to be covered. But as it is of great importance that steam should be applied while the bodies are being formed on the cone, a sufficient quantity should be taken from a boiler and conducted through a pipe placed close by the back stud of the triangular frame, which pipe turning over the center of the upright enters the lower end of a cock, marked O, which rests on a stand marked *z*, bolted to the top triangular piece and projecting over the bed-piece of the vibrating-frame, where it is made circular and sustains the cock, and a pipe which passes from its upper end up through the girth, where it is connected with a tin tube, *s*, *s*, made slightly circular to conform to the shape of the cones; this pipe has a joint, marked *p*, above the cock and below the girth, to which the top-piece is screwed, above which it enters the said bent tin pipe, which is perforated with small holes and is formed slightly circular, and may be wound with cloth to prevent a too great action of steam upon the web; the cones are made of tin of the shape and size desired for the bodies, and they are covered with wolen cloth, with a score *t*, *t*, in the middle, for the convenience of cutting the bodies apart; it is formed on a half-inch shaft made to fit the socket at the pulley end, and a bearing to fit the other end, and for the convenience of carrying off the condensed water, a tin trough, 15, 15, may be placed under the tin tube, and the water carried to a pail by a leaden pipe; similar pipes and conveniences must be brought under the cone where the hardening process is going on, for the introduction of steam to the bodies while the hardening is being done. All those pipes through which the steam is brought must have stop-cocks in them to regulate the steam; and for the more perfect explanation of our said machine, we have hereunto annexed two sheets of drawings representing the several parts of our machine distinguished from each other by letters of reference.

The above machinery combined and brought to operate as above set forth is our joint invention, and the result of many laborious and expensive experiments.

We do not claim as our invention any of the parts of said machines or machinery or motions separately and independently of their
673 connection in the machinery and the combinations herein described, but we do claim as our invention and improvement, and as new and useful, the above arrangement and combination of the parts of said machinery in manner as above described, or in any other manner substantially the same, which combination consists essentially in the producing the transverse vibratory and rotary motion as one action, so as that by winding upon cones a web of fur, and by the application at the same time of steam, in manner above described, and connected with the other operations provided for by the said machinery to form and harden a hat-body, and prepare the same for the sizing operation in a manner much easier, better, and more expeditious and

cheaper than has been heretofore done in any other way. As witness our hands.

HENRY A. WELLS.
JAMES JAMES.
ROBERT W. PECK.

Witnesses:
W. ROCKWELL.
674 CHAS. HARDY.

675 *The United States Patent Office to all persons to whom these presents shall come, greeting:*

This is to certify that the annexed is a true copy from the records of this office of letters patent granted Henry A. Wells, James James, and Robert W. Peck, September 22d, 1837. Improvement in the mode of making a batting or web for hat-bodies.

In testimony whereof, I, D. P. Holloway, commissioner of patents, have caused the seal of the Patent Office to be hereunto affixed [L. S.] this seventh day of August, in the year of our Lord one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-sixth.

D. P. HOLLOWAY,
Commissioner.

No. 392.

The United States of America to all to whom these letters patent shall come:

Whereas Henry A. Wells, James James, and Robert W. Peck, of Brooklyn, N. Y., have alleged that they have invented a new and useful improvement in the mode of making a batting or web for hat-bodies, which they state has not been known or used before their application; have made oath that they are citizens of the United States; that they do verily believe that they are the original and first inventors or discoverers of the said improvement, and that the same hath not, to the best of their knowledge and belief, been previously known or used; have paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

676 These are therefore to grant, according to law, to the said Henry A. Wells, James James, and Robert W. Peck, their heirs, administrators, or assigns, for the term of fourteen years, from the twenty-second day of September, one thousand eight hundred and thirty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Henry A. Wells, James James, and Robert W. Peck, in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to made patent, and the seal of the Patent Office has been hereunto affixed.

1605

[L. S.] Given under my hand, at the city of Washington, this twenty-second day of September, in the year of our Lord one thousand eight hundred and thirty-seven, and of the independence of the United States of America the sixty-second.

JOHN FORSYTH,
Secretary of State.

Countersigned and sealed with the seal of the patent office.

HENRY L. ELLSWORTH,
Commissioner of Patents.

The schedule referred to in these letters patent, and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, Henry A. Wells, James James, and Robert W. Peck, of the city of Brooklyn, in the county of Kings, in the State of New York, have invented certain new and useful improvements in a machine for making a batting of web for the manufacture of hat-bodies, invented by Thomas Blanchard, and for which letters patent of the United States are now pending, the interest in which, when the same shall be issued, has been assigned to us. And we do hereby declare that the following is a full and exact description of our
677 improvements on the said machine, including therein such references to the parts of the original machine as are deemed necessary to make our improvements fully known, and introducing them for this purpose only.

Our first improvement consists in the addition of a roller which is to press lightly upon the fur as it passes along the feed-apron previously to its entrance between the feed-rollers, which roller has been found necessary to prevent the fur from being drawn into the cards without passing between the feed-rollers, which, from its lightness, may otherwise happen. This roller is marked A in the accompanying drawing.

Secondly. Instead of the feeding-rollers originally employed, we have substituted two rollers of iron, B B, which are fluted from end to end, and which have been found to bring the fur upon the cards more equably and evenly than heretofore.

Thirdly. We employ a covering of thin boards, or other suitable material, which occupies the position represented by the red line, C, in the drawing, thus covering the cards over their tops as far back as between the doffer and quick-fancy; conforming the same, as far as practicable, to the shape of the space occupied by the cards when in place, and so as not to interfere with them when running.

Fourthly. We place a partition across the interior of the machine, in the situation represented by the verticle red line, D. This extends up from the bottom as near as possible to and between the doffer and the quick-fancy. By the aid of this partition we obtain a direct, equable, and correct current of air passing immediately upon and through all the cards to the quick-fancy, which, by means of this current of air, throws the fur in small particles into the air-chamber

free from the eddies and counter-currents of air, thus giving the fur a tendency to fall equably and uniformly upon the vellum or wire-cloth apron prepared to receive it.

Fifthly. We have added a board marked E on the drawings, and represented in red ink, which board forms a partition across the interior of the machine from under the quick-fancy and about half-way between it and the vellum; this is to prevent the fur from falling into the space between the fancy and the vellum, to the injury of the web.

678 *Sixthly.* We have added a receiving-board, shown on the drawings by red lines, and marked F. This receiving-board is placed upon a carriage with two axles and four wheels, and is made to traverse on a railway attached to the side of the machine, or sustained in any other convenient manner; this carriage is made to traverse backwards and forwards directly under the back part or end of the vellum; the traversing motion may be given to it by a crank, or by any gearing which the machinist may think best to use. The use of this carriage is to receive the web as it falls from the vellum, and to fold it neatly and conveniently for use.

Seventhly. We have added on the back side of the lower back roller, on which the wire-cloth or vellum revolves, a small roller lettered G, and marked with red ink on the drawings. This roller is placed on bearings on the sides of the machine, a little below the center of the back roller; this small roller, G, is turned by the wire-cloth or vellum, and is so placed as to prevent the web adhering to and following the vellum round, and to cause it to fall off clean upon the above-described receiving board.

Eighthly. Instead of the cam-wheel and its appurtenances, as described in Thomas Blanchard's specification, hereinbefore referred to, and employed to give a lateral vibratory motion to the hardening roller designated by the letter H in that specification, we have added and use the two levers marked H H in the drawings hereunto annexed. These levers have their fulcra at *h*, *h*, and at their upper ends they have each a pin attached to them, which enters an eccentric groove in the hub, i, by which, as the hub is made to revolve by the whirl, k, the levers vibrate on their fulcra, *h*, *h*, and consequently communicate the required motion to the rollers J and j, or to either of them as may be required.

Ninthly. We have added a small irregular board, shown on the drawings in red lines and by red dots, and marked I; the red dots are to denote holes which are made in the board, say three-eighths of an inch in diameter; this board thus perforated is placed in the inside of the vellum, between the upper and lower sides of the wire-cloth or vellum, resting in part on and in part inside of a stationary

679 box, which, in the original machine is placed between the upper and lower sides, or inside of the said vellum or wire-cloth; the side of the board, and the number and size of the holes, must be varied according to the size of the said wire-cloth vellum, and to the current or draught of air required, and all fitted to the place and position of the machine by the judgment and skill of the workman, ormed on the particular case by examining the machine under its

operation, its position as to air, the state of the atmosphere, and the materials to be used. Strips of small thin boards fastened together, or pieces of tin, sheet-iron, or any other metal, fastened together or laid in loose, or pieces of tin, or iron, or any other metal perforated with holes, or pipes perforated with holes, and the air made to pass through one or both ends for regulating the current of air, may be used for the same purpose. The object of the above board, plates, tinned iron tube, or tubes, is to cause an even equable current of air to pass through the vellum or wire-cloth over its whole surface at the same time, which causes the fur thrown by the quick-fancy, and suspended in the air, to fall, when it lights, even and equably and uniformly upon the whole surface of the vellum; this last operation is performed in the air-chamber, and when successful, as it may be easily made to be, leaves a thin, even, beautiful web of one uniform thickness, which, with little care, may easily be wrought into a hat-body.

Tenthly. The rollers, J, J, as shown in the drawings, are sometimes used in Blanchard's original machine, and sometimes not; they may be wholly omitted without any material inconvenience. The other parts of the drawings in black lines show so much of the original machine as is necessary to be shown to explain the drawings of these improvements, which, as practical hatters, by various experiments, we have been able to make.

We do not claim the original machine nor any of its parts as our invention or the invention of either of us, nor its combination or general arrangement.

Nor do we claim the rollers, levers, boards, or other parts which we have added separately and independently of said machine. But we do claim as our joint invention and improvement the several
680 additions to said machine as above specified, in their combination and connection with said machine, for the uses and purposes aforesaid, whereby the original machine is much improved and rendered far more useful.

As witness our hands.

HENRY A. WELLS.
JAMES JAMES.
ROBERT W. PECK.

Witnesses:
EDWARD STRAN SMITH.
ROBERT R. RAYMOND.

681 *The United States Patent Office to all persons to whom these presents shall come, greeting:*

This is to certify that the annexed is a true copy from the records of this office of letters patent, granted Henry A. Wells, Sept. 11th, 1841. Improvement in machine for shrinking bodies in the manufacture of felt cloth and hat-bodies.

In testimony whereof, I, D. P. Holloway, Commissioner of Patents, [L S.] have caused the seal of the Patent Office to be hereunto affixed this seventh day of August, in the year of our Lord one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-sixth.

D. P. HOLLOWAY, *Commissioner.*

No. 2245.

The United States of America to all to whom these letters patent shall come:

Whereas Henry A. Wells, New York, has alleged that he has invented a new and useful improvement in the machine for shrinking bodies in the manufacture of felt cloth and hat-bodies, which he states has not been known or used before his application, has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Henry A. Wells, his heirs, administrators, or assigns, for the term of
682 fourteen years, from the eleventh day of September, one thousand eight hundred and forty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Henry A. Wells, in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.
[L S.] Given under my hand, at the city of Washington, this eleventh day of September, in the year of our Lord one thousand eight hundred and forty-one, and of the independence of the United States of America the sixty-sixth.

DANIEL WEBSTER,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

HENRY L. ELLSWORTH,
Commissioner of Patents.

The schedule referred to in these letters patent, and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, Henry Augustus Wells, of the city, county, and State of New York, have invented an improvement in a machine heretofore used for shrinking bodies and napping hat-bodies, and which with this improvement I use in my method of manufacturing cloth or other fabrics as described in my specification bearing even date herewith, and designated as a fulling-machine or cylinder, or double drum, and I do hereby declare that the following is a full and exact description thereof.

Plate I, fig. 1, being a side view, and fig. 2 an end view, the end being supposed to be transparent.

An ordinary hollow metallic cylinder *B*, figs. 1 and 2, is sup-
683 ported or suspended on two uprights, *d*, *d*, and is made to revolve in slot bearings in those uprights by a pulley *b*, (which gets its motion in any convenient manner,) or by any other convenient means; in the inside of this cylinder a hollow hexagonal metallic prism *A*, fig. 2, is constructed, of which the outer edges or angles are securely fastened to the interior of the cylinder, so as to revolve with it, and the prism is of equal length with the cylinder, and its ends are soldered to the ends or heads of the cylinder, so as to prevent any communication between them; this prism may have any other convenient angular figure or polygon for its base; into this interior space thus formed, the article to be operated upon is placed through the door *C*, fig. 2, which can be tightly closed; through one of the journals a pipe passes, with a stop-cock *a*, fig. 1; by this means steam is admitted into the interior of the machine; a stop-cock *S*, fig. 1, allows the steam and water to escape from the interior when required; through the other journal a pipe passes with a stop *c;* this pipe is bent so soon as it reaches the interior of the machine, and passing along the inner side of that head or end of the machine, leads through one of the sides of the prism, and admits steam into one of the spaces *t*, figs. 1 and 2, between the cylinder and the prism; and small openings being left in the edges of the prism, which are there made thick for that purpose, the steam finds its way into those spaces, *t*, *t*, without escaping into the prism, and by this means a dry heat can be produced within the prism; a stop-cock *f*, fig. 1, allows the steam and water to escape from the spaces *t*, *t;* when required, the machine may have an oscillating motion given it, so as to cause its ends to raise and fall alternately from twenty to twenty-five degrees; this is done by means of cranks, a bent axle, or in any other convenient manner.

In order to use this machine, the article to be fulled or hardened, either rolled up in canvas, or cotton, or linen cloth, or not, as is thought advisable, is placed in it through the door *C*, fig. 1, steam admitted through the pipe and stop-cock *a*, fig. 1, and the machine is set in motion, and has at the same time a convenient and proper rotary and oscillating motion, and the article to be operated upon is thrown violently against the sides and ends of the machine, whilst it is kept warm and moist by the steam; when the moist heat has been
continued long enough, the stop-cock *a* is closed, the steam
684 (and water rising from its condensation) is allowed to escape through the stop-cock *s*, fig. 1, and when it has escaped this stop-cock is closed; the stop-cock at *c*, fig. 1, being then opened, the spaces *t*, *t*, are kept filled with steam, and the motion of the machine is kept up, by which the article inside is kept in motion and subjected to a powerful dry heat; by these operations the article is fulled or shrunk to a considerable degree; when this has been continued long enough, the machine is stopped, the stop-cock *c* is closed, and the steam and water arising from its condensation escape through the stop-cock *f*, fig. 1; the goods are then taken out, and the machine is immediately ready for the reception of other articles. The machine may be made of great diameter, say twelve or fourteen feet, or even

larger, and then the interior being divided into several compartments by partitions, *w*, *w*, fig. 2, several pieces of goods may be subjected to the action of the machine at the same time, or several pieces may be operated upon at the same time without compartments. The effect proposed by this mode of operation is to make the material shrink, contract, or felt by the direct application of the steam, and this is accelerated and fixed by the application of dry heat afterwards produced by the steam in the spaces *t*, the rotating and alternating motion of the drum or vessel being designed to turn over the material and expose it on all sides to the action of the steam and heat. The principle of this improvement which I claim as my invention consists in the mode of operation, whereby the material to be shrunk, contracted, or felted with rapidity and evenness is subjected to the direct action of steam and afterwards only to a dry heat in a double vessel kept all the time in motion, so that the material may be exposed on every side to the action of the steam or heat during the operation as aforesaid. It is obvious that an outer and inner vessel of any form and dimensions may be used, and yet the principle be the same. I have described the form I prefer. But I claim as my invention the use of any mechanical means operating substantially in the same mode to produce the same effect.

Witness my hand this sixth day of August, in the year of our Lord one thousand eight hundred and forty-one.

H. A. WELLS.

Witnesses:
M. R. BREWER.
C. B. ZABRISKIE.

685 *The United States Patent Office to all persons to whom these presents shall come, greeting:*

This is to certify that the annexed is a true copy from the records of this office of letters patent granted Henry A. Wells, September 18th, 1841; improvement in the machine for fulling, milling, or planking felt, cloths, etc.

In testimony whereof, I, D. P. Holloway, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto [L. S.] affixed this seventh day of August, in the year of our Lord one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-sixth.

D. P. HOLLOWAY,
Commissioner.

No. 2255.

The United States of America to all to whom these letters patent shall come:

Whereas, Henry A. Wells, New York, has alleged that he has invented a new and useful improvement in the machine for fulling, milling, or planking felt, cloths, etc., which he states has not been known or used before his application; has made oath that he is a citi-

zen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Henry A. Wells, his heirs, administrators, or assigns, for the term of
686 fourteen years from the eighteenth day of September, one thousand eight hundred and forty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Henry A. Wells in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand, at the city of Washington, this eighteenth day of September, in the year of our Lord one thousand
[L. S.] eight hundred and forty-one, and of the independence of the United States of America the sixty-sixth.

DANIEL WEBSTER,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

HENRY L. ELLSWORTH,
Commissioner of Patents.

The schedule referred to in these letters patent, and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, Henry Augustus Wells, of the city, county, and State of New York, have invented a new machine for felting fabrics made of wool, fur, hair, or cotton, called a milling, fulling, or planking machine, and which machine I use in my method of manufacturing cloth or other fabrics, as described in my specification bearing even date herewith; and I hereby declare that the following is a full and exact description thereof.

Fig. 1, plate I, is an end view of the machine, and fig. 2 a front view of the same. *A A B* is a triangular frame, of which there are two, one at each end of the machine, and placed about eight feet apart; a horizontal cross-piece *D* is supported on *B B*, having
687 journals which pass through *B* at *C;* on this cross-piece a long ribbed hammer, nearly as long as the space between the frames, and of which *a* is an end view, is supported by a long handle *O*, so as to be swung freely towards and from *B B;* this hammer has a slightly curved face. *C* is the end view of a metallic or wooden box as long or longer than the hammer, with a partition *r* running the length of the box, so as to make two entirely separate compartments; the lower

one of these is perforated at small intervals on the side nearest to *a*, while the upper one is tight; steam is admitted into the lower one by the stop-cock *S*, and into the upper one by the stop-cock *t*, and the steam and water arising from condensation are drawn off from the upper compartment by another stop-cock on the other end of the machine. A cam *f* is supported as represented in the drawing or in any other convenient manner, and is moved on its axis by the crank *e* or by other convenient means, and thus made to pass against and recede from the handle *O* of the hammer. A lever *d*, whose fulcrum is at *i*, is connected with the handle *O* of the hammer by a joint at *q*, or in any other convenient manner, so as to allow the lever *d* to oscillate on its fulcrum where the hammer is moved, the point *g* being at a greater distance from C than the fulcrum *i* is; *h* is a weight placed on the lever for the purpose of forcing back the hammer when relieved from the pressure of the cam *f;* a bearer, of which *m* is an end view, in form a segment of a circle, and of equal length with the hammer, is connected with and suspended from the lever *d* by the standard or brace *l*.

In order to use this machine, the article or bat *C*, to be planked, milled, or fulled, is rolled up, covered with canvas or any cotton material, and placed between hammer *a* and the box *b*, the hammer being drawn away from the box *b* sufficiently to admit the article *C*. The hammer is then set in motion by turning the crank *e*, so as to present the cam *f* lengthwise to or parallel with the handle *O* of the hammer, which is forced back and away from the article *C* by the operation of the weight *h* acting upon the lever *d;* the crank is then turned, the cam *f* presses the handle, and the hammer is driven against the article or bat *C;* at the instant that the blow is struck the bearer *m* is pressed down upon the article or bat *C*, which is
688 prevented from escaping the blows of the hammer by this bearer and the curved face of the box *b*; the blows of the hammer are given in rapid succession, and while the hammer is forced back the article or bat *C* rolls for a short space down the curved face *b* so as to change a little the part exposed to the blow of the hammer, which, having a curved face, and striking partly under the article or bat *C*, forces it again back up and against the bearer *m* and box *b*. By a series of strokes, a complete revolution or several revolutions of the article or bat *C* is accomplished, thus exposing every part of it to many blows. As soon as the machine is set in motion, steam is admitted through the stop-cock *S*, which leads into the perforated part of the box, and thus a moist heat is imparted to the fabric or bat *C*. When the article has been sufficiently acted upon in this way the stop-cock *t* is opened, by which steam is admitted into that part of the box which is tight, and the article is submitted to the action of the hammer while under the influence of a dry heat; the blows of the hammer may be increased in severity by the addition of a shifting weight or weights. In the course of the operation, as well while submitted to the influence of dry as of moist heat, the article, fabric, or bat *C* must be frequently taken out, and the folds or rolls changed.

When the operation has been continued the required time, the machine is stopped, and the steam (and water arising from its condensa-

tion) in the tight part of the box *b* is allowed to escape through the stop-cock corresponding with *t*, and the machine is ready for further use. The machine may be fitted with side-hammers (one on each side) whose faces are so shaped so as to strike the ends of the article, fabric, or bat *C* squarely; these hammers will get their motion by means similar to those by which the main hammer is moved, and make their blows at the instant the main hammer begins to recede from the article *C*, and are of great use in equallizing the fulling, milling, or planking of the goods.

This machine is used to felt and contract the material still more closely than may be done by my improvement in the fulling-machine, the specification of which bears even date herewith, the material being placed in the cavity between the hammer and the curved face,
689 in part perforated with steam holes as aforesaid, and the machine put in action; it is manifest that the hammer, the face, the bottom, and the top *m* forms a box sufficiently tight to retain the steam thrown in during the pressure, and that as every operation the steam or heat has opportunity to perforate the material, which it does alternately with every close pressure that is given to the material, which is made to revolve as aforesaid by slow degrees till the feeding and felting is completed. It is obvious that different forms and dimensions may be used in the construction of this machine, and yet the principle remain the same.

What I claim as my invention, and desire to secure by letters patent, is the method herein described, of subjecting the material or bat to the action of moist and dry heat in combination with the method above described of applying pressure.

Witness my hand this twenty-fourth day of August, one thousand eight hundred and forty-one.

H. A. WELLS

Witnesses:
B. R. MORSELL.
A. WILLIAMS.

690

691 *The United States Patent Office to all persons to whom these presents shall come, greeting:*

This is to certify that the annexed is a true copy from the records of this office of letters patent granted Henry A. Wells, Sept. 18th, 1841.

In testimony whereof, I, D. P. Holloway, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed, [L. S.] this eighth day of August, in the year of our Lord, one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-sixth.

D. P HOLLOWAY,
Commissioner.

No. 2256.

The United States of America to all to whom these letters patent shall come:

Whereas Henry A. Wells, New York, has alleged that he has invented a new and useful improvement in the machine for hardening felt cloths, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he verily believes that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Henry A. Wells, his heirs, administrators, or assigns, for the term
692 of fourteen years, from the eighteenth day of September, one thousand eight hundred and forty-one, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Henry A. Wells in the schedule hereunto annexed, and is made part of these presents,

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand, at the city of Washington, this eighteenth day of September, in the year of our Lord one thousand eight
[L. S.] hundred and forty-one, and of the independence of the United States of America the sixty-sixth.

DANIEL WEBSTER,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.

HENRY L. ELLSWORTH,
Commissioner of Patents.

The schedule referred to in these letters patent, and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, Henry Augustus Wells, of the city, county, and State of New York, have invented *an improvement in a machine heretofore used for hardening hat-bodies*, and which, with this improvement, I use in my method of manufacturing cloth or other fabrics, as described in my specification bearing even date herewith, and designated as a hardening machine, and I do hereby declare that the following is a full and exact description thereof. The machine with my improvement is represented in the accompanying drawings, plate 1, fig. 1, plate 2, figs, 1, 2, and 3, and plate 3, fig. 4, and consists of two platens, or broad smooth bodies, the under one of which—a, fig. 1, plates 1, 2, and 3—is

of metal, is cast hollow, and the upper face perforated at small
693 intervals to allow the steam to escape, which is introduced through a pipe or pipes fitted with a stop-cock, the steam being admitted as long as is required by the operation. A series of tubes W, as represented in the drawing, plate 1, or in some other convenient position, are contained within this metallic box; these tubes are made perfectly tight, and do not allow the steam to escape upon the article which it is desired to harden; they are connected with a pipe or pipes by a tube, into which they all enter, and by a stop-cock. Steam is admitted for the purpose of giving dry heat to or dry-heating the articles to be hardened. This metallic box or platen is supported on legs or in other convenient manner; over it passes a traveling or endless apron C, fig. 1, plates 1 and 2, which is kept sufficiently stretched by the roliers b, b, fig. 1, plates 1 and 2, which may be two, four, or other convenient number. The upper platen d, fig. 1, plates 1 and 2, is fastened to the under one so as to allow the upper one to be raised as the lid of a trunk, and also so as to allow it to receive an alternating motion when desired, while resting on the under platen, or any article that may be placed between them; this is done as follows (or it may be done by the other means:) two supporters, Y, Y, fig. 1, plate 2, are fastened to the under platen; through these an axle, S, passes, and is made to turn in them by the crank r, having from one-half to three-quarters of an inch throw; the upper platen is connected with this axle by the hinges p, p, figs. 1, 2, and 3, plate 2, which are made with slots, 4, and fastened to the upper platen by a screw, whose head being on the under side prevents the upper platen from being disengaged from the hinges, and at the same time allows it to slide on them and across the machine as required; fig. 2, plate 2, is a plan view of these hinges, and fig. 3, same plate, is a side view showing the position of the screw. The upper platen is connected to and receives motion from the axle S, by the connecting rods or straps, t, t, fig. 1, plate 2, which pass on to the pins O, O, projecting from the axle S, so that as the crank r is turned from or towards the under platen, the upper one is set in motion, and the platen is carried for a short distance across the under platen and then back again. In
order to use this machine, the upper platen d is raised and
694 the bat with its canvas or other articles to be operated upon is drawn along on the traveling apron C the length of the platen; the upper platen is then shut down, and a weight or weights being place on it if necessary, motion is given to it by moving the crank forward a short space; at the same time steam is admitted in the lower platen through the cock, so as to produce moist heat (by the escape of the steam through the perforated face of the under platen) on the bat or article to be hardened; when this operation has been continued sufficiently long, the stop-cock, which has been opened, is closed, and no more steam is allowed to enter that part of the under platen from which it can escape through the perforations in its upper face; but the steam is admitted into the tubes W, and thus a dry heat is produced, which is continued until the bat or article shall have been sufficiently hardened, the motion of the upper platen being kept up during the application of any heat. The upper platen is then raised

and another length of bat is subjected to the operation of the machine as before described.

What I claim in the above-described machine is the method herein described of applying to the bat a moist and dry heat in combination with the method herein described of applying friction thereto.

Witness my hand this twenty-fourth day of August, one thousand eight hundred and forty-one.

H. A. WELLS.

Witnesses:
B. K. MORSELL.
A. WILLIAMS.

No. 4951.

695 *The United States of America to all to whom these letters patent shall come:*

Whereas Lemuel Lyon, of Roxbury, Massachusetts, has alleged that he has invented a new and useful improvement in the manufacture of hat-bodies, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Lemuel Lyon, his heirs, administrators, or assigns, for the term of fourteen years, from the fifth day of February, one thousand eight hundred and forty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Lemuel Lyon, in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand, at the city of Washington, this fifth day of February, in the year of our Lord one thousand eight
[L. S.] hundred and forty-seven, and of the independence of the United States of America the seventy-first.

JAMES BUCHANAN,
Secretary of State.

Countersigned and sealed with the seal of the Patent Office.

EDMUND BURKE,
Commissioner of Patents.

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696 *The schedule referred to in these letters patent, and making part of the same.*

TO ALL PERSONS TO WHOM THESE PRESENTS SHALL COME:

Be it known that I, Lemuel Lyon, of Roxbury, in the county of Norfolk and State of Massachusetts, have invented a new and useful improvement in hardening hat-bodies composed of fur and cotton, or other proper fibrous matters, and I do hereby declare that the nature of my invention, and the manner in which it operates, are fully set forth and represented in the following specification, accompanying drawings, letters, figures, and references thereof. My invention or improvement is particularly applicable to the hardening of hat-bodies when made or formed in any of the modes usually practiced, or by any other proper method. The process of hardening the same, as heretofore adopted, has been very expensive and laborious in comparison with that employed by me, and hereinafter described, inasmuch as steam and hot air have generally been used in connection with the mechanism for producing the desired effect, and the hat-body has been removed from the block upon which it was formed, thereby causing it to stretch, and become more or less injured. Figure 1 of the afore-mentioned drawings represents a top view of the mechanism by which I effect the hardening of the hat-bodies. Figure 2 is a side elevation of the same. Figure 3 is a vertical and central section of it; and figure 4 is a side view of the block or frustum upon which the hat-body is formed and kept during the operation of hardening it, as will be hereinafter described.

In figures 1, 2, and 3, A denotes a solid block in the shape of a frustum of a cone; B is a hollow vessel, made to correspond in shape with, and to receive within it, the conic frustum or block A, as seen in figures 1 and 2. The vessel B should be made of such size with respect to the block A that when the latter is introduced within it, and their adjacent surfaces are made parallel to each other, there shall be a small space existing between them of about one-fourth of an inch in width.

The vessel B is supported upon a bed or plank, C, by a table, E, resting upon any suitable number of legs, D, D. The block
697 A is to have slight reciprocating or vibrating motions imparted to it in horizontal directions, which may be effected by means of a connecting rod, F, which works at one end upon a pin, L, inserted in the top of the block A, and at the other end upon an eccentric pin, N, inserted in the side of a circular plate, G, applied and affixed to one end of a horizontal shaft, H, supported and revolving in suitable bearings at the tops of posts I, I, and put in revolution by a crank, K, or in any other proper manner. Instead of the block A being made to move to and fro within the vessel B, as described, it may be suspended within the said vessel, and the latter be made to vibrate or move about it with a short reciprocating motion.

In either case, a very trifling degree of motion will suffice to produce the effect of hardening. The outer conic surface of the block A need not move more than about one-half an inch forward and back,

with respect to the contiguous surface of the vessel surrounding it. The process of hardening the hat-body is as follows: After it is formed in any known manner, the fibres of fur, or material or materials to be hardened of which it is composed, lay together or upon one another, in a very loose or flocky state. In such a state it is to be covered by a damp or wet cloth made to fit over its exterior surface, (or that which is to be placed in opposition with the interior surface of the vessel,) and to bind it closely down upon the external surface of the block A.

In this state the whole is introduced into the vessel B, so that the external surface of the cloth shall rest in contact with the internal surface of the vessel, which being done, the block, together with the hat-body and confining cloth upon it, should be put in motion within the case or vessel B, in the manner as before described.

The short vibrating or reciprocating motion so imparted to the block soon causes the fibres of fur, or fur and other material of which the hat-body is composed, to become densely compacted together, or hardened in the desired manner, and to the extent required.

What I claim as my invention, and seek to secure by letters patent, is the aforesaid improvement, by which I effect the hardening of a hat-body, namely, by means of a conic frustum or block, upon
698 which the body is placed or formed, and a damp cloth applied to the fibrous matter upon the block, in combination with a hollow vessel B, surrounding the whole, the block A having a short reciprocating motion upon its axis imparted to it when placed within the vessel B, and the whole being made to operate together, as above specified.

In testimony whereof, I have hereto set my signature this 20th day of January, A. D. 1846.

LEMUEL LYON.

Witnesses:
R. H. EDDY.
GEO. H. BAILEY.

699 *The United States Patent Office to all persons to whom these presents shall come, greeting:*

This is to certify that the annexed is a true copy from the records of this office of letters patent granted Edward F. Condit and Alfred Taylor, March 19th, 1850.

In testimony whereof, I, D. P. Holloway, Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this sixteenth day of September, in the year of our Lord one thousand eight hundred and sixty-one, and of the independence of the United States the eighty-sixth.

[L. S.]

D. P. HOLLOWAY,
Commissioner.

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No. 7182.

The United States of America to all to whom these letters patent shall come:

Whereas, Edward F. Condit and Alfred Taylor, of Springfield, N. J., have alleged that they have invented a new and useful improvement in machines for making hat-bodies, (they having assigned their whole right, title, and interest in said invention to Woodbridge Eaglesfield, of Springfield, aforesaid,) which they state has not been known or used before their application; have made oath that they are citizens of the United States; that they do verily believe that they are the original and first inventors or discoverers of the said improvement, and that the same hath not, to the best of their knowledge and belief, been previously known or used; have paid into the treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvement, and praying that a patent may be granted for that purpose.

These are therefore to grant, according to law, to the said Woodbridge Eaglesfield, his heirs, administrators, or assigns,
700 for the term of fourteen years from the nineteenth day of March, one thousand eight hundred and fifty, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvement, a description whereof is given in the words of the said Condit and Taylor, in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof, I have caused these letters to be
[L. S.] made patent, and the seal of the Patent Office has been hereunto affixed.

Given under my hand, at the city of Washington, this nineteenth day of March, in the year of our Lord one thousand eight hundred and fifty, and of the independence of the United States of America the seventy-fourth.

T. EWING,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

THOMAS EWBANK,
Commissioner of Patents.

THE SCHEDULE REFERRED TO IN THESE LETTERS PATENT, AND MAKING PART OF THE SAME.

To all whom it may concern:

Be it known that we, Edward F. Condit and Alfred Taylor, of Springfield, in the State of New Jersey, have invented an improvement on machines for making hat-bodies of fur, of which improvement the following is a description:

In the machines for making hat-bodies of fur, which are now in

use, the fur, after having been cleaned and separated from the hair found in it, is placed on a feed-apron, or between feed-aprons, and is conveyed on them to feed-rollers, through which it passes. It is then received by a rotary brush, and thrown into a trunk or chamber, through which it floats, and with a current of air passes on to a conical former, and is made to settle upon the former by means of the partial exhaustion of air beneath the former

701 The conical former, as it revolves slowly, receives the fur as required, and a hat-body is thus formed, which is then hardened by the application of cloths dipped in hot water, and by immersion in hot water.

This improvement, for which a patent is now solicited, consists in combining with the feed-rollers and brush a cylindrical rotary card, and one or more narrow, flat, stationary cards, placed above and so near to the cylindrical card as to be just in contact with it. This cylindrical card is between the feed-rollers and brush, and parallel to them; its axis is in the same plane with the line at which the feed-rollers meet, or a little above it. A second cylindrical card is placed between the brush and the flat cards, and above the first cylindrical card, in such a position in relation to them as to work against the face of the first cylindrical card, and to be operated upon by the brush.

The fur, as it is fed through the roller, is received by the first cylindrical card, which revolves very rapidly, and the fur is thereby worked against the stationary card, and its fibres separated.

The second cylindrical card, which revolves slowly, assists in the working and more thorough and complete separation of the fibres of the fur.

The fur is then taken from the cylindrical cards by the brush, which also revolves with great rapidity, and is thrown into the trunk and carried forward and deposited upon the cone of the former. This improvement is exhibited in the drawings hereto annexed, in connection with such other parts of the machine with which it is used as are necessary to represent the application of the improvement.

Fig. 1 represents a vertical section of the machine.

Fig. 2 a side view of it.

Fig. 3 a horizontal section of the same machine.

A, in fig. 3, represents the feed-apron; B, in figs. 1 and 3, the feed-rollers; C, in figs. 1 and 3, the first cylindrical card; D, in fig. 1, the narrow, flat cards placed thereon; E, in figs. 1 and 3, the trunk; F, in figs. 1, 2 and 3, the trunk or chamber; G, the conical former; H, in fig. 1, the second cylindrical card.

702 Instead of using the flat stationary cards, small cylindrical cards may be substituted, revolving very slowly, which will answer the same purpose as the flat stationary cards, and the second cylindrical card may be dispensed with; but better work is done when all are used together, as above described.

By means of this improvement, both of the cylindrycal cards is kept clear by the action of the brush; the fur is better prepared for being floated and carried through the trunk, and for deposit on the former or cone; the fibres are more thoroughly separated; the hat-

body is of a more even and uniform texture; the fur is fed with more rapidity, and more and better work can be done.

What we claim as our improvement, and desire to secure by letters patent, is the combination of the rotating brush for throwing the fibres, with the cards which take the fibres from the feed-rollers, and separate and prepare them, and with the trunk which guides, and the exhausted former on which the fibres are deposited, substantially as herein described.

EDWARD F. CONDI T
ALFRED TAYLOR.

Witnesses:
ISRAEL D. CONDIT.
WILMINGTON CAMPBELL.

703 HENRY A. BURR *v.* PETER S. DURYEE AND OTHERS. } On bill, &c.—On the Hopkins patent.

And now, to wit, on this 1st day of May, 1862, this cause came on to be heard at this term, on bill, answer, and proofs, and having been argued by counsel, thereupon, after consideration, it is ordered, adjudged, and decreed, that the bill be dismissed and the defendants do recover of the plaintiff their costs. And it is further ordered that the special injunction, heretofore granted, be dissolved.

SAME *v.* SAME. } On bill, &c.—On the Wells patent.

And now, to wit, this 1st day of May, 1862, this cause came on to be heard at this term, on bill, answer, and proofs, and having been argued by counsel; thereupon, after consideration, it is ordered, adjudged, and decreed, that the bill be missed, and that the defendants do recover of the plaintiff their costs.

704 HENRY A. BURR *v.* PETER S. DURYEE AND OTHERS, def'ts. } On bill, &c.—On the Taylor patent.

And now, to wit, this 1st day of May, 1862, this cause came on to be heard at this term, on bill, answer, and proofs, and having been argued by counsel, thereupon, after consideration, it is ordered, adjudged, and decreed, that the bill be dismissed and the defendants do recover of the plaintiff their costs. And it is further ordered that the orders for account, heretofore made in this cause, be discharged, and that the security, heretofore given in this case, be also discharged.

Circuit court of the United States for the district of New Jersey.—In equity.

HENRY A. BURR, complainant,
and
PETER S. DURYEE, HENRY H. JAQUES, AND HENRY W. DURYEE, defendants.
} On bill.—On Lansing E. Hopkins's patent.

The complainant, Henry A. Burr, hereby appeals to the Supreme Court of the United States from the decree of the circuit court in this cause and from the whole of said decree, because, as he alleges,
705 the said decree is contrary to law, erroneous and void; and he prays that a transcript of the bill, answer, depositions and other proceedings in the cause may be transmitted to the said Supreme Court, and that a citation to the defendants may be issued, citing them to be and appear at the said Supreme Court, to be held at Washington on the first Monday in December next, to show cause, &c.

JOSEPH P. BRADLEY,
Solicitor for and of Counsel with Complainant.

Circuit court of the United States for the district of New Jersey.—In equity.

HENRY A. BURR, complainant,
and
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE, defendants.
} On bill, &c.—On Henry A. Wells's patent.

The complainant, Henry A. Burr, hereby appeals to the Supreme Court of the United States from the decree of the circuit court in this cause and from the whole of said decree, because he alleges the said decree is contrary to law, erroneous, and void; and he prays that a transcript of the bill, answer, depositions and other proceedings in the cause may be transmitted to the said Supreme Court, and that a citation to the defendants may be issued, citing them to be and
706 appear at the said Supreme Court, to be held at Washington on the first Monday in December next, to show cause, &c.

JOSEPH P. BRADLEY,
Solicitor for and of Counsel with Complainant.

Circuit court of the United States for the district of New Jersey.—In equity.

HENRY A. BURR, complainant,
and
PETER S. DURYEE, HENRY H. JAQUES, AND HENRY W. DURYEE, defendants.
} On bill.—On Alva B. Taylor's patent.

The complainant, Henry A. Burr, hereby appeals to the Supreme Court of the United States from the decree of the circuit court in this cause and from the whole of said decree, because, as he alleges, the said decree is contrary to law, erroneous, and void; and he prays that

a transcript of the bill, answer, depositions and other proceedings in the cause may be transmitted to the said Supreme Court, and that a citation to the defendants may be issued, citing them to be and appear at the said Supreme Court, to be held at Washington on the first Monday in December next, to show cause, &c.

JOSEPH P. BRADLEY,
Solicitor for and of Counsel with Complainant.

707 Know all men by these presents that we, Henry A. Burr, of the city of New York, and Israel D. Condit, of the town of Milburn, in the State of New Jersey, are held and firmly bound unto Peter S. Duryee, Henry H. Jaques, and Henry W Duryee, in the sum of two hundred and fifty dollars, to be paid to the said Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, their executors, administrators, or assigns; for which payment, well and truly to be made, we bind ourselves, our heirs, executors, and administrators, jointly and severally, firmly by these presents. Sealed with our seals, and dated the twenty-ninth day of July, in the year eighteen hundred and sixty-two.

The condition is, that whereas the said Henry A. Burr hath appealed to the Supreme Court of the United States from a decree of the circuit court of the United States for the district of New Jersey, lately made in a certain cause wherein the said Henry A. Burr was complainant, and the said Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee were defendants: Now, if the said Henry A. Burr shall prosecute his said appeal to effect, and answer all damages and costs, if he shall fail to make good his plea, then this obligation to be void, or else to remain in full force and virtue.

H. A. BURR, [SEAL.]
108 ISRAEL D. CONDIT, [SEAL.]

Sealed and delivered in presence of—
M. B. ANDRUS.

UNITED STATES OF AMERICA,
Southern District of New York,
City and County of New York, ss:

Israel D. Condit, being duly sworn, deposes and says that he is a householder, residing in the town of Millburn, county of Essex, and State of New Jersey, and that he is worth the sum of five hundred dollars over and above all just debts and liabilities and property exempt by law from execution.

ISRAEL D. CONDIT.

Sworn to before me this 31st day of July, 1862.

[SEAL.] M. B. ANDRUS,
Notary Public, City and County of New York.

I approve the within bond as satisfactory security, and order the same to be filed. July 31st, 1862.

PH. DICKERSON, *Judge.*

Know all men by these presents that we, Henry A. Burr, of the city of New York, and Israel D. Condit, of Millburn, New Jersey, are held and firmly bound unto Peter S. Duryee, Henry H. Jaques,
709 and Henry W. Duryee, in the sum of two hundred and fifty dollars, to be paid to the said Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, their executors, admsnistrators, or assigns, for which payment, well and truly to be made, we bind ourselves, our heirs, executors, and administrators, jointly and severally, firmly by these presents. Sealed with our seals and dated the twenty-ninth day of July, in the year eighteen hundred and sixty-two.

The condition is, that whereas the said Henry A. Burr hath appealed to the Supreme Court of the United States from a decree of the circuit court of the United States for the district of New Jersey, lately made in a certain cause wherein the said Henry A. Burr was complainant, and the said Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee were defendants: Now, if the said Henry A. Burr shall prosecute his said appeal to effect, and answer all damages and costs, if he shall fail to make good his plea, then this obligation to be void, or else to remain in full force and virtue.

H. A. RURR, [SEAL.]
ISRAEL D. CONDIT, [SEAL.]

Sealed and delivered in presence of—
M. B. ANDRUS.

UNITED STATES OF AMERICA,
Southern District of New York,
City and County of New York, ss:

710 Israel D. Condit, being duly sworn, deposes and says that he is a householder, residing in the town of Millburn, county of Essex, and State of New Jersey, and that he is worth the sum of five hundred dollars over and above all just debts and liabilities and property exempt by law from execution.

ISRAEL D. CONDIT.

Sworn before me this 31st day of July, 1862.

[L. S.] M. B. ANDRUS,
Notary Public, City and County of New York.

I approve the within bond as satisfactory security, and order the same to be filed. July 31st, 1862.

PH. DICKERSON, *Judge, &c.*

Know all men by these presents that we, Henry A. Burr, of the city of New York, and Israel D. Condit, of the town of Millburn, in the State of New Jersey, are held and firmly bound unto Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee in the sum of two hundred and fifty dollars, to be paid to the said Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, their executors, adminis-

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trators, or assigns, for which payment, well and truly to be
711 made, we bind ourselves, our heirs, executors, and administrators, jointly and severally, firmly by these presents. Sealed with our seals and dated the twenty-ninth day of July, in the year eighteen hundred and sixty-two.

The condition is, that whereas the said Henry A. Burr hath appealed to the Supreme Court of the United States from a decree of the circuit court of the United States for the district of New Jersey lately made in a certain cause, wherein the said Henry A. Burr was complainant, and the said Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee were defendants: Now, if the said Henry A. Burr shall prosecute his said appeal to effect, and answer all damages and costs, if he shall fail to make good his plea, then this obligation to be void, or else to remain in full force and virtue.

H. A. BURR. [SEAL.]
ISRAEL D. CONDIT. [SEAL.]

Sealed and delivered in the presence of—
M. B ANDRUS.

UNITED STATES OF AMERICA,
Southern District of New York,
City and County of New York, ss:

Israel D. Condit, being duly sworn, deposes and says that he is a householder, residing in the town of Millburn, county of Essex,
712 and State of New Jersey; and that he is worth the sum of five hundred dollars over and above all just debts and liabilities and property exempt by law from execution.

ISRAEL D. CONDIT.

Sworn to before me this 31st day of July, 1862.

M. B. ANDRUS.
[L. S.] *Notary Public, City and County of New York.*

I approve the within bond as satisfactory security, and order the same to be filed. July 31st, 1863.

PH. DICKERSON, *Judge, &c.*

UNITED STATES OF AMERICA, *ss:*

To Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, greeting:

Whereas, from the decree lately made by the circuit court of the United States for the district of New Jersey in a certain cause, wherein Henry A. Burr was complainant, and you were defendants, relating to a certain patent granted to one Lansing E. Hopkins, the said Henry A. Burr hath appealed to the Supreme Court of the United States, and hath filed his said appeal in the clerk's office of said circuit court at Trenton, and hath given good and sufficient security to prosecute his said appeal to effect, and answer all damages;

713 therefore you are hereby cited and admonished to be and appear at a Supreme Court of the United States, to be holden at Washington on the first Monday in December next, pursuant to said appeal, to show cause, if any there be, why the decree so appealed from, as aforesaid, should not be corrected, and speedy justice should not be done to the parties in that behalf.

Witness the honorable Philemon Dickerson, a judge of said circuit court, at Trenton, the thirty-first day of July, eighteen hundred and sixty-two.

PH. DICKERSON, *Judge.*

DISTRICT OF NEW JERSEY, *City of Newark, ss:*

Joseph P. Bradley maketh oath and saith that he served Cortlandt Parker, the solicitor of the defendants in the within stated case, with a citation signed by his honor Philemon Dickerson, one of the judges of the circuit court of the United States for the district of New Jersey, of which the within is a true copy, by leaving the same for him in his office in the city of Newark, with a person in attendance therein, on the second day of August, in the year eighteen hundred and sixty-two.

JOSEPH P. BRADLEY.

Sworn and subscribed before me, Daniel Dodd, a notary
714 public, duly commissioned and sworn this second day of August, 1862. Witness my hand and official seal the day and
[L. S.] year aforesaid.

DAN'L DODD,
Notary Public.

UNITED STATES OF AMERICA, *ss:*

To Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, greeting:

Whereas from the decree lately made by the circuit court of the United States for the district of New Jersey, in a certain cause wherein Henry A. Burr was complainant and you were defendants, relating to a certain patent granted to one Henry A. Wells, and other patents reissued thereupon, the said Henry A. Burr hath appealed to the Supreme Court of the United States, and hath filed his said appeal in the clerk's office of said circuit court at Trenton, and hath given good and sufficient security to prosecute his said appeal to effect, and answer all damages and costs if he fails to make good the same, therefore you are hereby cited and admonished to be and appear at a Supreme Court of the United States, to be holden at Washington on the first Monday in December next, pursuant to said appeal, to show cause, if any there be, why the decree so appealed from as
715 aforesaid should not be corrected and speedy justice should not be done to the parties in that behalf.

Witness the honorable Philemon Dickerson, a judge of said circuit court at Trenton, the thirty-first day of July, eighteen hundred and sixty-two.

PH. DICKERSON, *Judge.*

1627

DISTRICT OF NEW JERSEY, *City of Newark, ss:*

Joseph P. Bradley maketh oath and saith that he served Cortlandt Parker, the solicitor of the defendants in the within stated case, with a citation signed by his honor Philemon Dickerson, one of the judges of the circuit court of the United States for the district of New Jersey, of which the within is a true copy, by leaving the same for him in his office, in the city of Newark, with a person in attendance therein, on the second day of August, in the year eighteen hundred and sixty-two.

JOSEPH P. BRADLEY.

Sworn and subscribed before me, Daniel Dodd, a notary public, duly commissioned and sworn, this second day of August, 1862.
[L. S.] Witness my hand and official seal the day and year aforesaid.

DAN'L DODD,
Notary Public.

716 UNITED STATES OF AMERICA, *ss:*

To Peter S. Duryee, Henry H. Jaques, and Henry W. Duryee, greeting:

Whereas from the decree lately made by the circuit court of the United States for the district of New Jersey, in a certain cause wherein Henry A. Burr was complainant and you were defendants, relating to a certain patent granted to one Alva B. Taylor and another patent reissued thereupon, the said Henry A. Burr hath appealed to the Supreme Court of the United States, and hath filed his said appeal in the clerk's office of said circuit court at Trenton, and hath given good sufficient security to prosecute his said appeal, to effect and answer all damages and costs if he fails to make good the same, therefore you are hereby cited and admonished to be and appear at a Supreme Court of the United States, to be holden at Washington on the first Monday in December next, pursuant to said appeal, to show cause, if any there be, why the decree so appealed from, as aforesaid, should not be corrected and speedy justice should not be done to the parties in that behalf.

Witness the honorable Philemon Dickerson, a judge of said circuit court, at Trenton, the thirty-first day of July, eighteen hundred and sixty-two.

PH. DICKERSON, *Judge.*

717 DISTRICT OF NEW JERSEY,
City of Newark, ss:

Joseph P. Bradley maketh oath and saith that he served Cortlandt Parker, the solicitor of the defendants in the within stated case, with a citation signed by his honor Philemon Dickerson, one of the judges of the circuit court of the United States for the district of New Jersey, of which the within is a true copy, by leaving the same for him in his office in the city of Newark, with a person in attendance therein,

on the second day of August, in the year eighteen hundred and sixty-two.

JOSEPH P. BRADLEY.

Sworn and subscribed before me, Daniel Dodd, a notary public, duly commissioned and sworn, this second day of August, [L. s.] 1862. Witness my hand and official seal the day and year aforesaid.

DAN'L DODD,
Notary Public.

718 Circuit court of the United States for the district of New Jersey.

HENRY A. BURR
v.
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE,
} On bill, &c.—On the Wells patent.

SAME
v.
SAME.
} On bill, &c.—On the Taylor patent.

SAME
v.
SAME.
} On bill, &c.—On the Hopkins patent.

The complainant having appealed to the Supreme Court of the United States from the several decrees made in the above stated cases, and having given satisfactory security as required by law, and it appearing to the court that the matter in dispute exceeds the sum or value of two thousand dollars, and the court deeming it reasonable to allow the said appeals, do allow the same accordingly. And the said cases having been heard together upon one set of depositions, and proofs taken for all of said cases, it is ordered that the clerk make out and transmit to the Supreme Court of the United States at Washington a transcript of the several bills, answers,
219 depositions, and other proceedings, in the said cases attached together in a single schedule, so that one transcript and return may answer for all the said cases. On motion of

JOSEPH P. BRADLEY,
Solicitor for the complainant and appellant.

August 4th, 1862.

720 Circuit court of the United States for the district of New Jersey.

HENRY A. BURR
vs.
PETER S. DURYEE, HENRY H. JAQUES, and HENRY W. DURYEE,
} On bill, &c.—On Wells patent.

SAME *v.* SAME.	On bill, &c.	On Taylor patent.
SAME *v.* SAME.	On bill, &c.	On Hopkins patent.

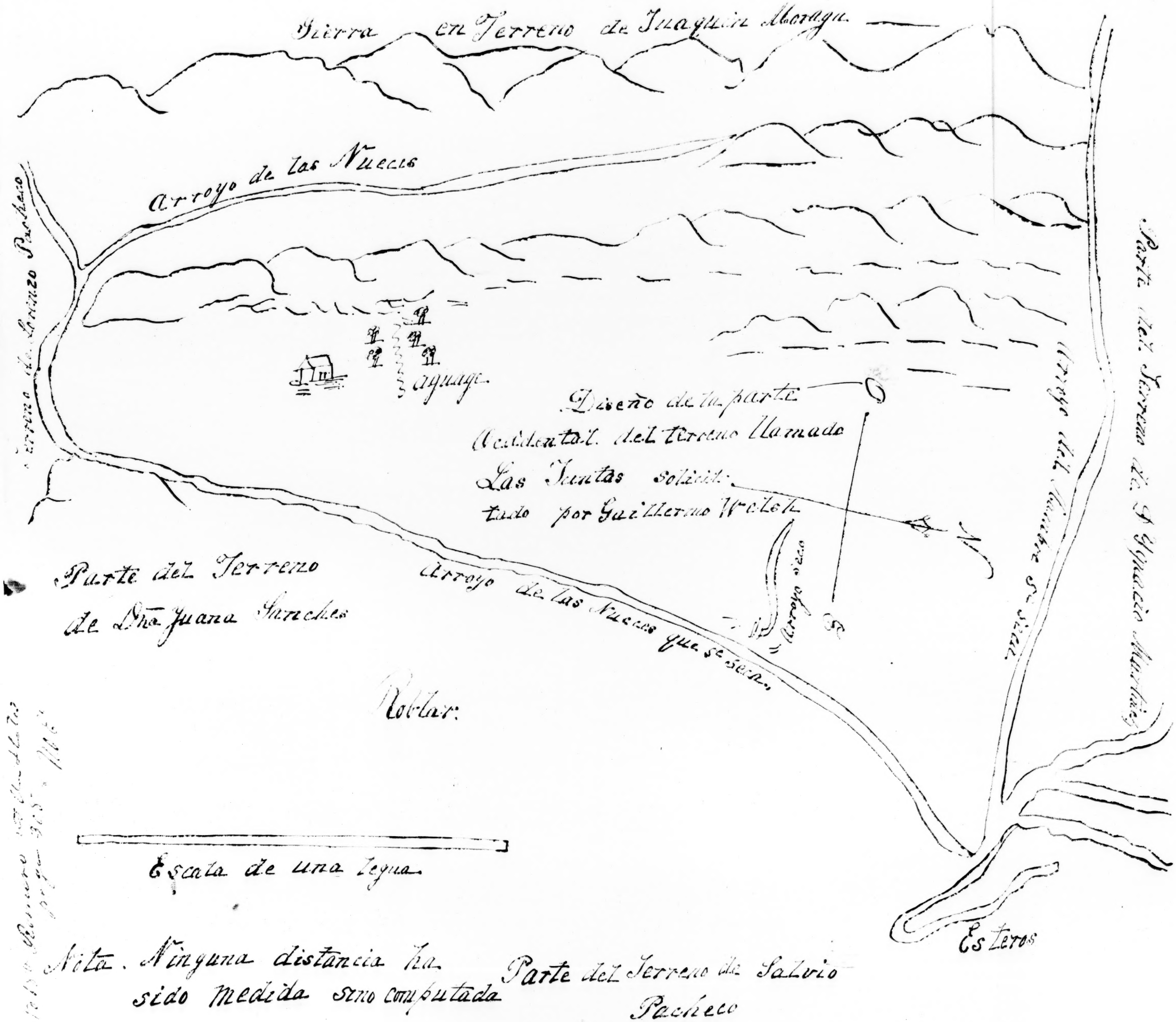
I, Andrew Dutcher, clerk of the circuit court of the United States for the district of New Jersey, do hereby certify that the foregoing is a true and correct transcript of the several bills, answers, depositions, and other proceedings in the cases above stated, and of so much of the documentary evidence therein as was contained in the printed record used on the argument of said cases in the said circuit court.

In witness whereof I have hereto set my hand and official seal at the city of Trenton, this thirteenth day of August, in the year of our Lord one thousand eight hundred and sixty-two.

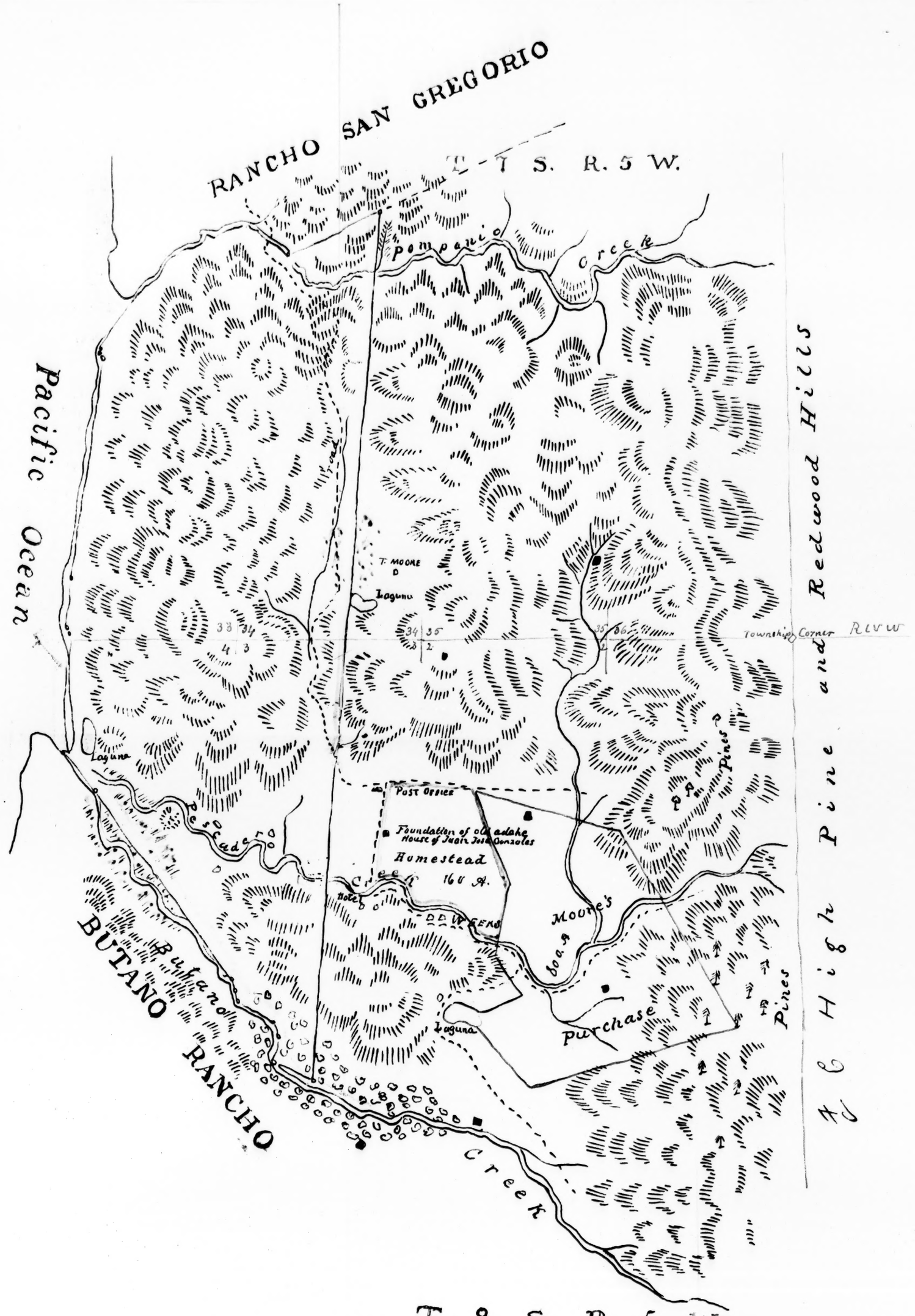
[SEAL.]

ANDREW DUTCHER, *Clerk.*

Filed Aug. 25, 1862.


Sierra en Terreno de Juaquin Moraga
Arroyo de las Nueces
Terreno de Lorenzo Pacheco
aguage
Diseño de la parte
Occidental del terreno llamado
Las Juntas solicit-
tado por Guillermo Welsh
N
E
Arroyo seco
Arroyo del Hambre se sicia
Parte del Terreno de D. Ygnacio Martinez
Parte del Terreno
de Dña Juana Sanches
Arroyo de las Nueces que se seca
Roblar
Escala de una legua
Esteros
Nota. Ninguna distancia ha
sido medida sino computada
Parte del Terreno de Salvio
Pacheco

Contr. Gonzales vs U.S. page 49



A
TOPOGRAPHICAL MAP OF
the Country known as the
RANCHO PESCADERO
IN
Santa Cruz Co.
Surveyed March 1861, by
Chas. T. Healy
AND
S. Worsley Smith.

Scale 40 chs. the inch
Mag Var 15°30' E.

Explanation of Colors
Red ---- Moore's Purchase
Blue ---- Brenner's "
Green ---- Homestead of Widow Gonzales
Purple ---
Yellow- boundaries of Rancho, located by Healy.

Exhibit A- annexed to deposition of S. Worsley Smith

Filed Aug 21- 1861-
W. H. Chevers
Clerk-

No 182- Gonzales vs U. S. page 75-

United States Surveyor Genls Office
San Francisco California
May 7th 1861-

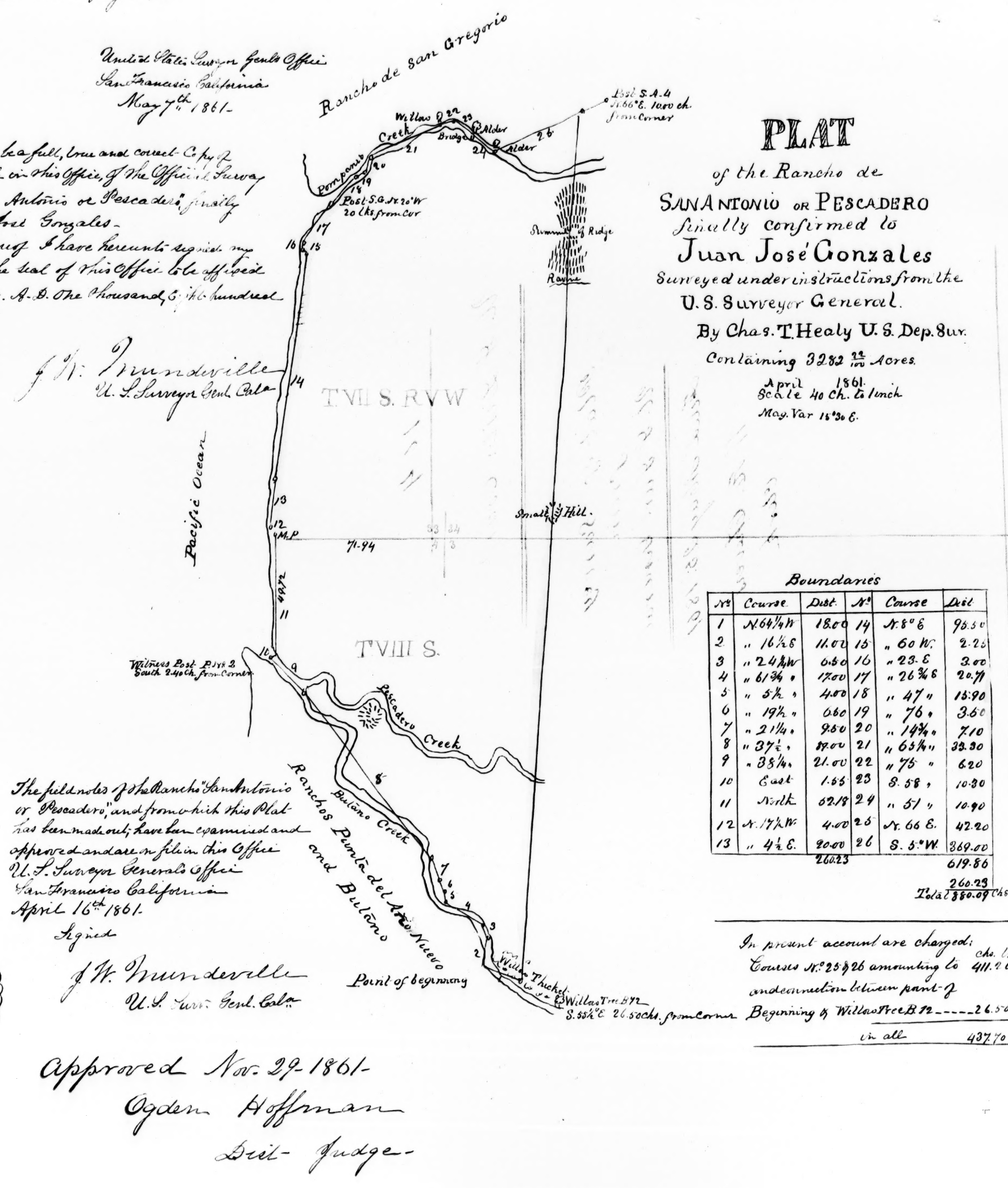
I hereby certify this to be a full, true and correct Copy of the original Plat on file in this Office, of the Official Survey of the Rancho de "San Antonio or Pescadero" finally confirmed to Juan José Gonzales-

In witness whereof I have hereunto signed my name, and caused the seal of this Office to be affixed this Seventh day of May. A. D. One Thousand, Eight hundred and Sixty One

J. W. Trumbull
U. S. Surveyor Genl Cala

PLAT

of the Rancho de
SAN ANTONIO OR PESCADERO
finally confirmed to
Juan José Gonzales
Surveyed under instructions from the
U. S. Surveyor General.
By Chas. T. Healy U. S. Dep. Sur.
Containing 3282 22/100 Acres.
April 1861.
Scale 40 Ch. to 1 inch
Mag. Var 15°30 E.



Boundaries

No	Course	Dist.	No	Course	Dist.
1	N. 64¼ W	18.00	14	N. 8° E	96.50
2	" 16½ E	11.00	15	" 60 W.	2.25
3	" 24¾ W	6.50	16	" 23 E	3.00
4	" 61¾ "	17.00	17	" 26¾ E	20.71
5	" 5½ "	4.00	18	" 47 "	13.90
6	" 19½ "	6.60	19	" 76 "	3.60
7	" 21¼ "	9.50	20	" 14¾ "	7.10
8	" 37½ "	37.00	21	" 65¼ "	33.30
9	" 38¼ "	21.00	22	" 75 "	6.20
10	East	1.55	23	S. 58 "	10.30
11	North	62.18	24	" 51 "	10.90
12	N. 17½ W	4.00	25	N. 66 E.	42.20
13	" 4½ E.	20.00	26	S. 5° W.	369.00
		260.23			619.86
					260.23
				Total	880.09 Chs. = 11 M. 09 Chs.

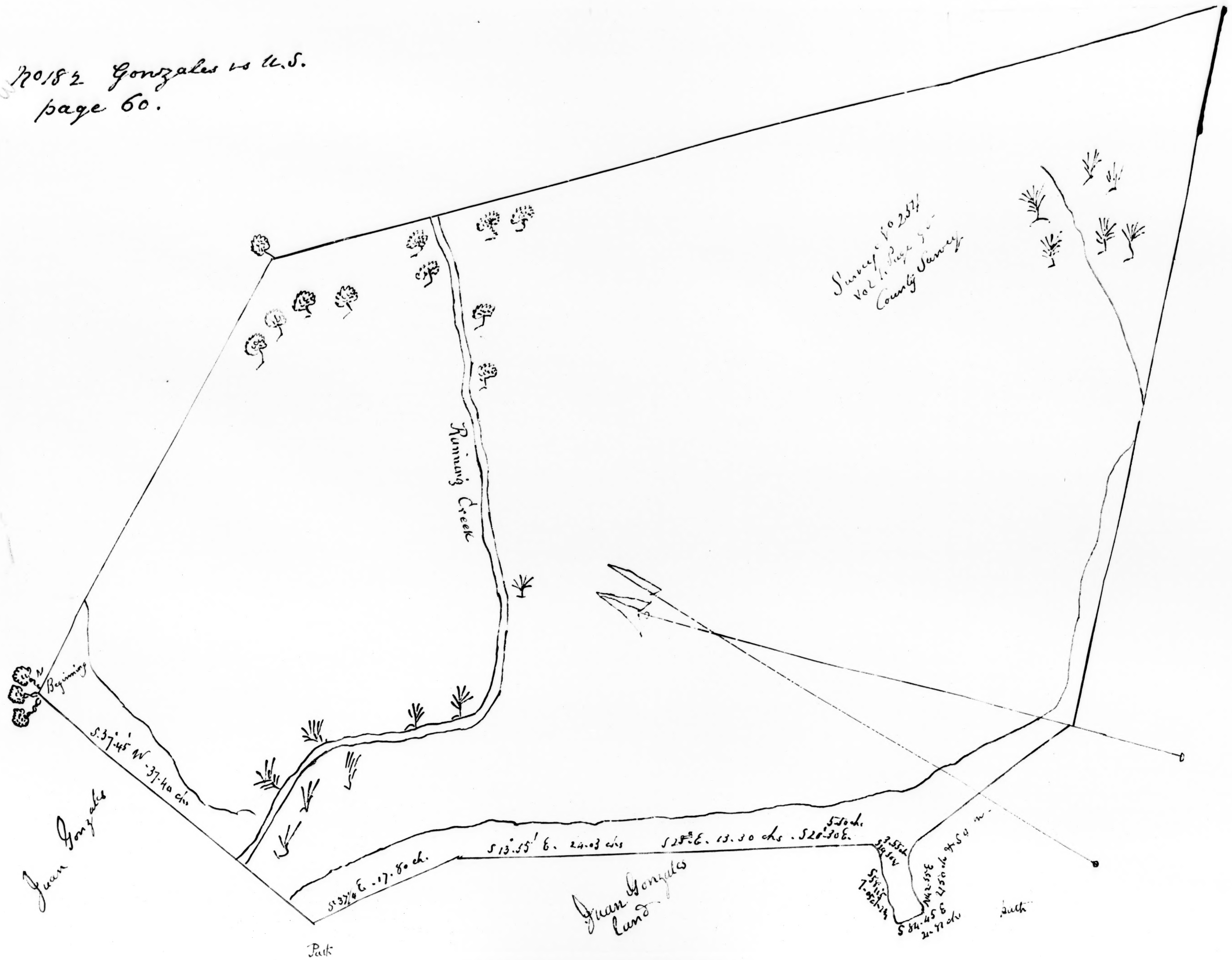
The field notes of the Rancho "San Antonio or Pescadero," and from which this Plat has been made out; have been examined and approved and are on file in this Office
U. S. Surveyor Generals Office
San Francisco California
April 16th 1861.
Signed
J. W. Trumbull
U. S. Surv. Genl. Cala

In present account are charged:
Courses No. 25 & 26 amounting to 411.20 chs. lks
and connection between point of
Beginning & Willow Tree B.T. ---- 26.50
in all 437 70 = 5 Miles 87 chs. 70 lks.

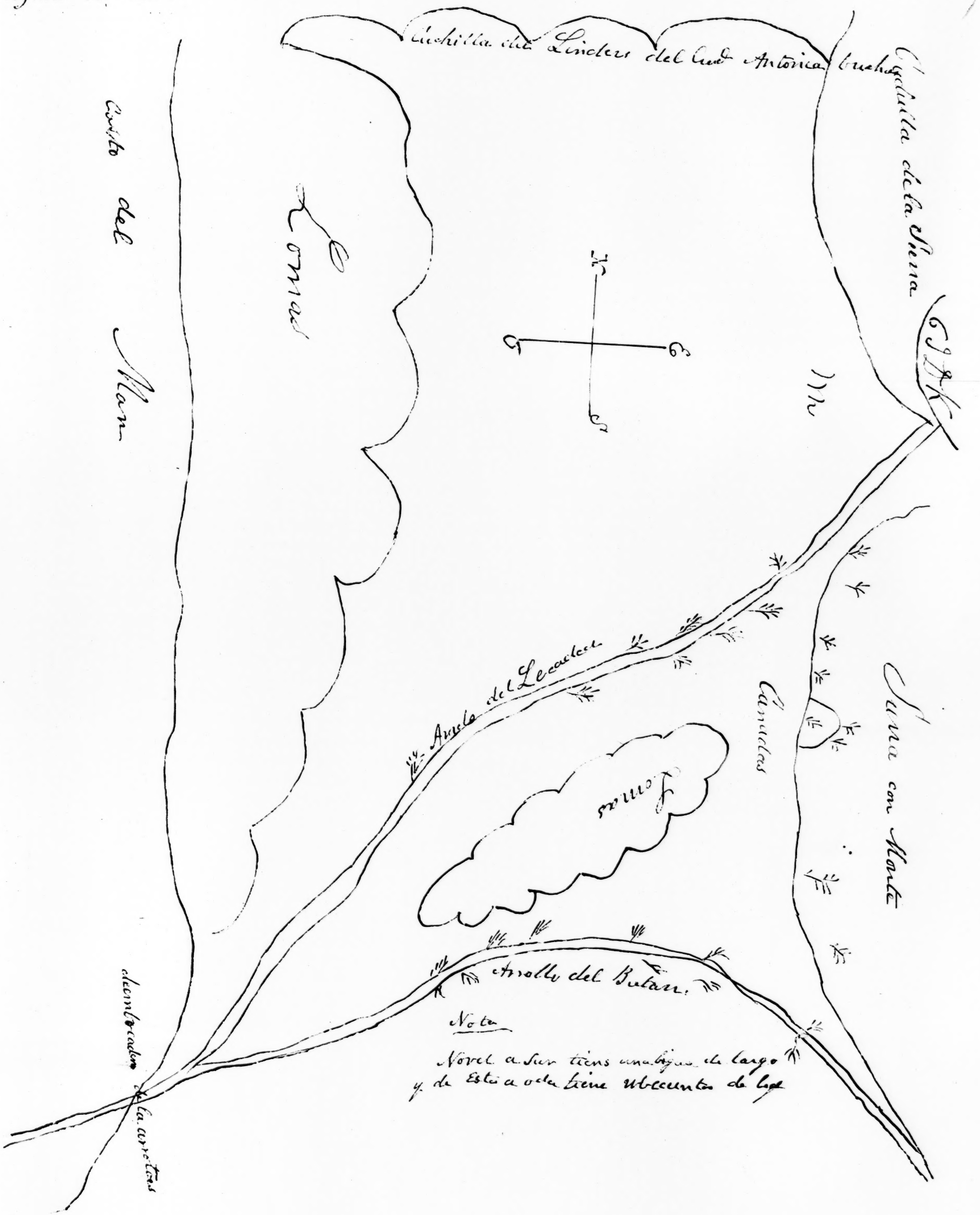
L. S.

Approved Nov. 29-1861-
Ogden Hoffman
Dist- Judge-

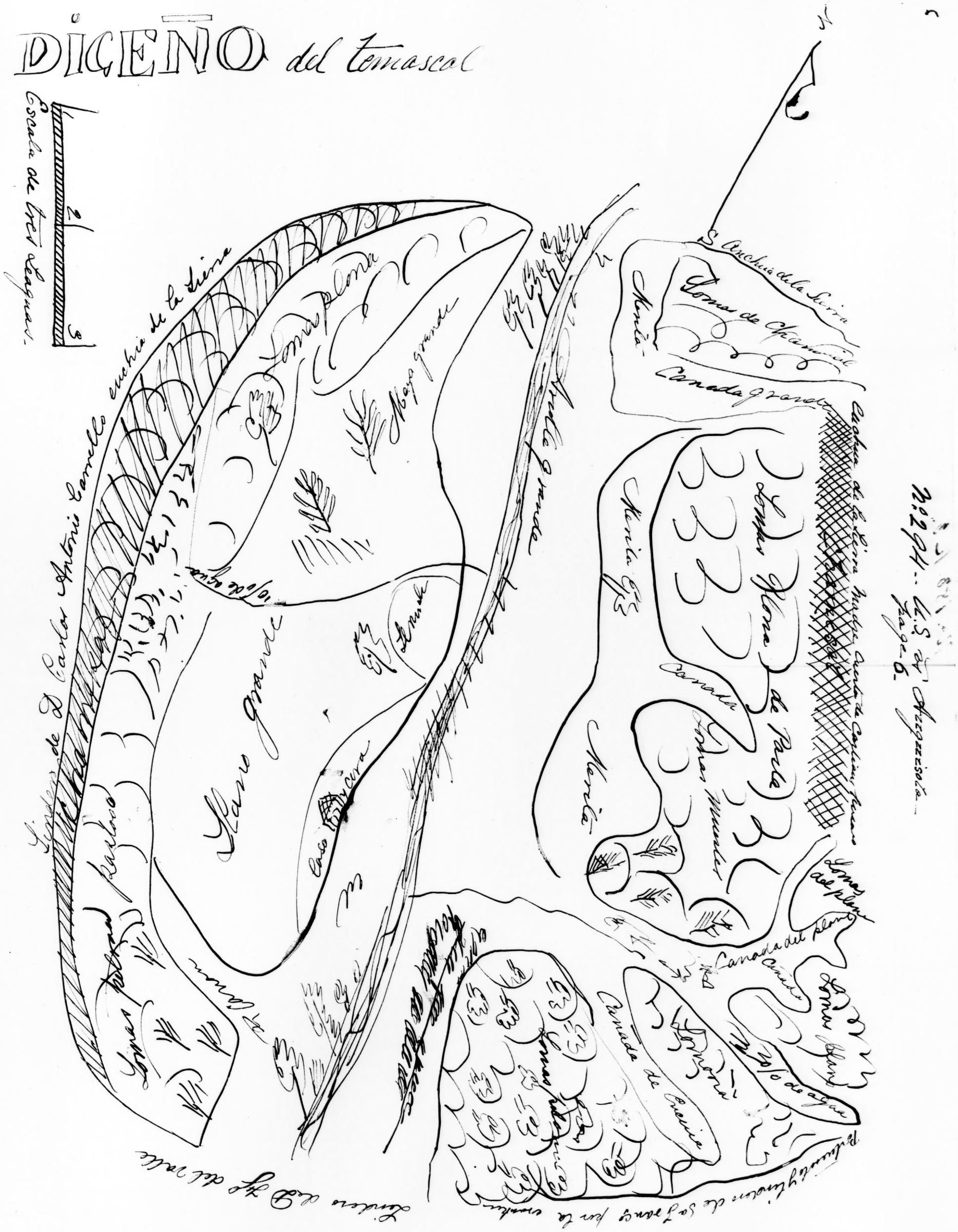
No 182 Gonzales vs U.S.
page 60.



No. 182 page 88
Gonzales vs. U.S.



DICEÑO del temascal



No. 294. U.S. of Arizpizola
Page 6.

No 296. U.S. Exploring Expedition

Plano del Distrito de Sn Mateo Ysla Manana Ysla grande

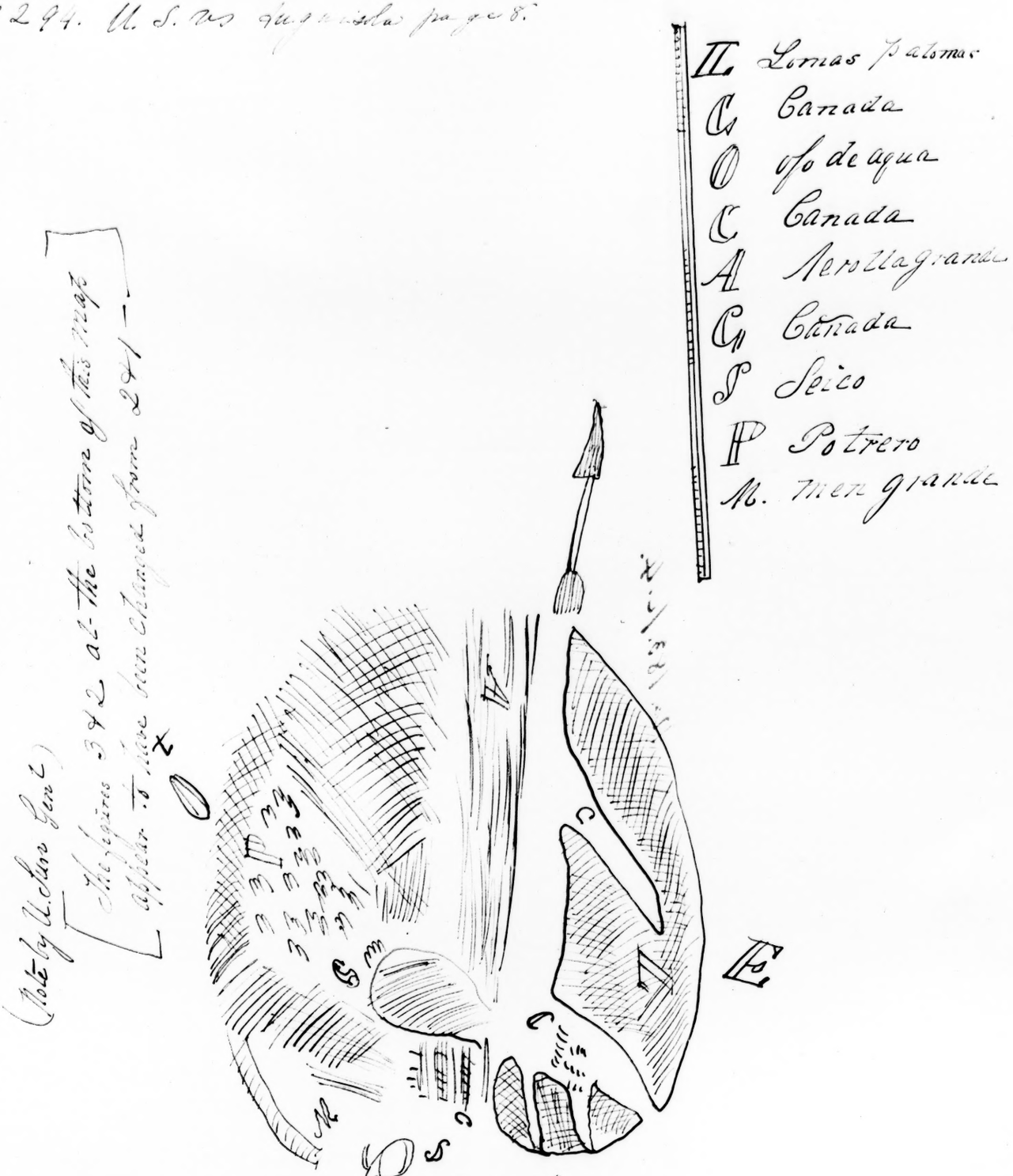
Lindero con el Paso Llamado el Nacimto

Corral

Camino para

Escala de 1000 varas

N° 294. U. S. vs Luguisola page 8.



Aplicacion

Tierre de Sur á Norte [3] Leguas y de Poriente al Pucente [4] degua y media

Plano del Terreno que media entre el Rancho de Dn Mariano Soberanes y el Pueblo de Salinas

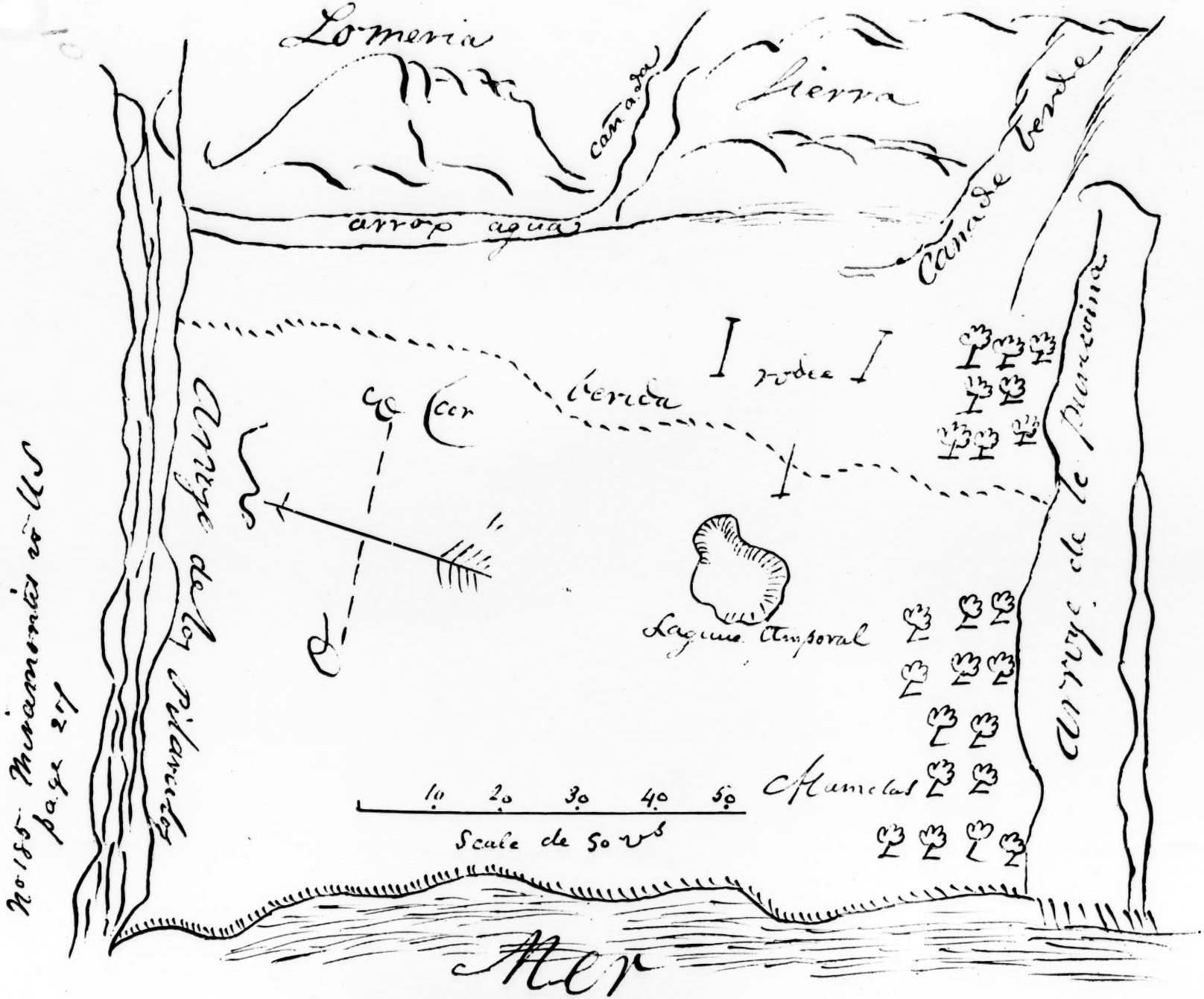
Escala de 100 varas

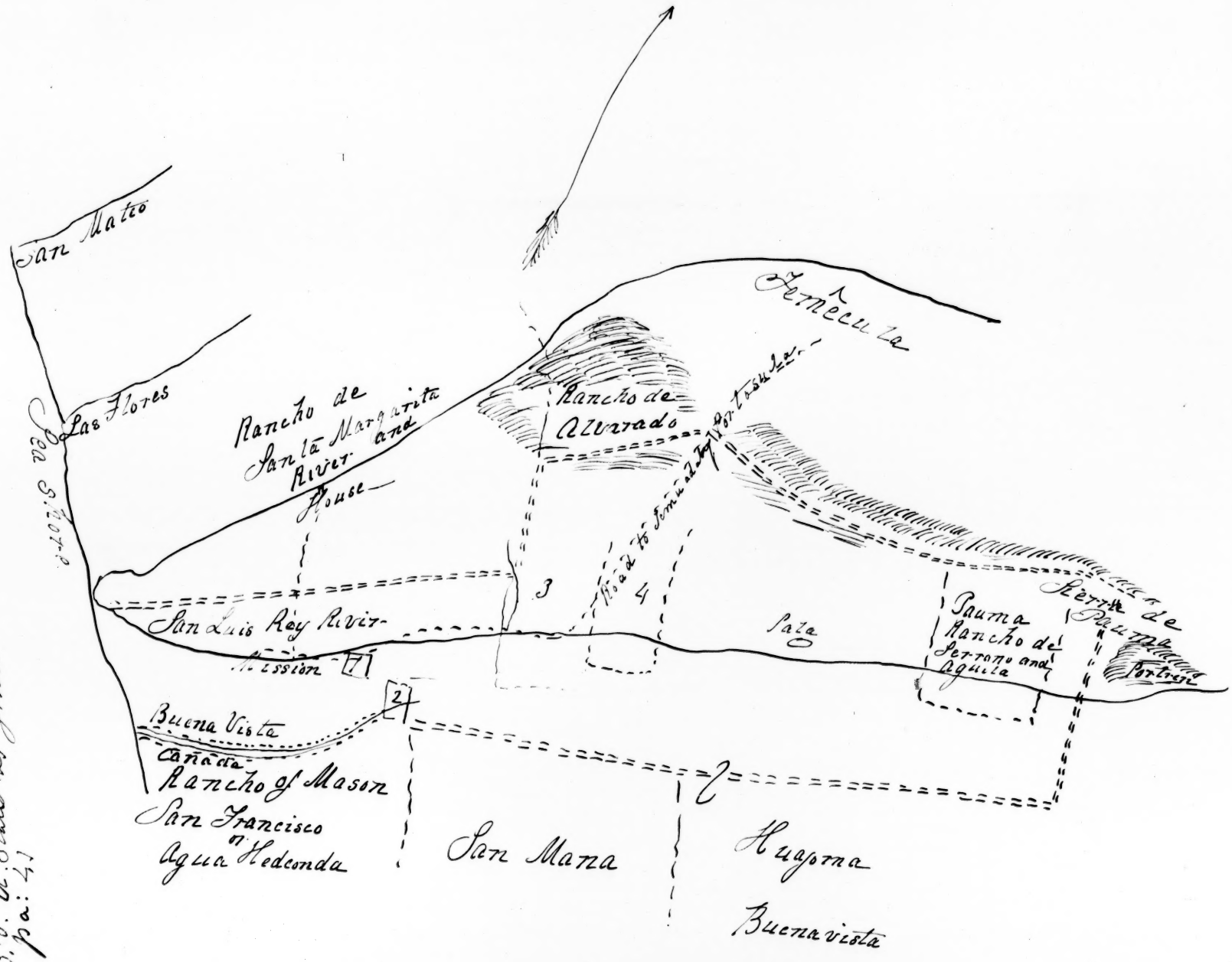
Salinas

Rancho de Dn Mariano Soberanes

S

N


Lomeria
cañada
Sierra
arroyo agua
Cañada verde
rodea
berida
cor
Arroyo de los Pilarcitos
Arroyo de la Puricoina
Laguna Amporal
Mamelas
10 20 30 40 50
Scale de 50 vs
Mer
No 185 Miramontes vo US
page 27



No 3.10. U. States vs Gmes
pa: 41

Nº 206 U. S. V. de Cota
page 30

(10 JDK

Recapitulacion

A Corral y tierra de regadea

B Ojo de Agua

G Ojo de Agua

D Cañada de Sta Rosa y camina real de Purissima

E Rio de la Purisima

F Cañada de Arrellanes ojo de Agua y tierra de regadea

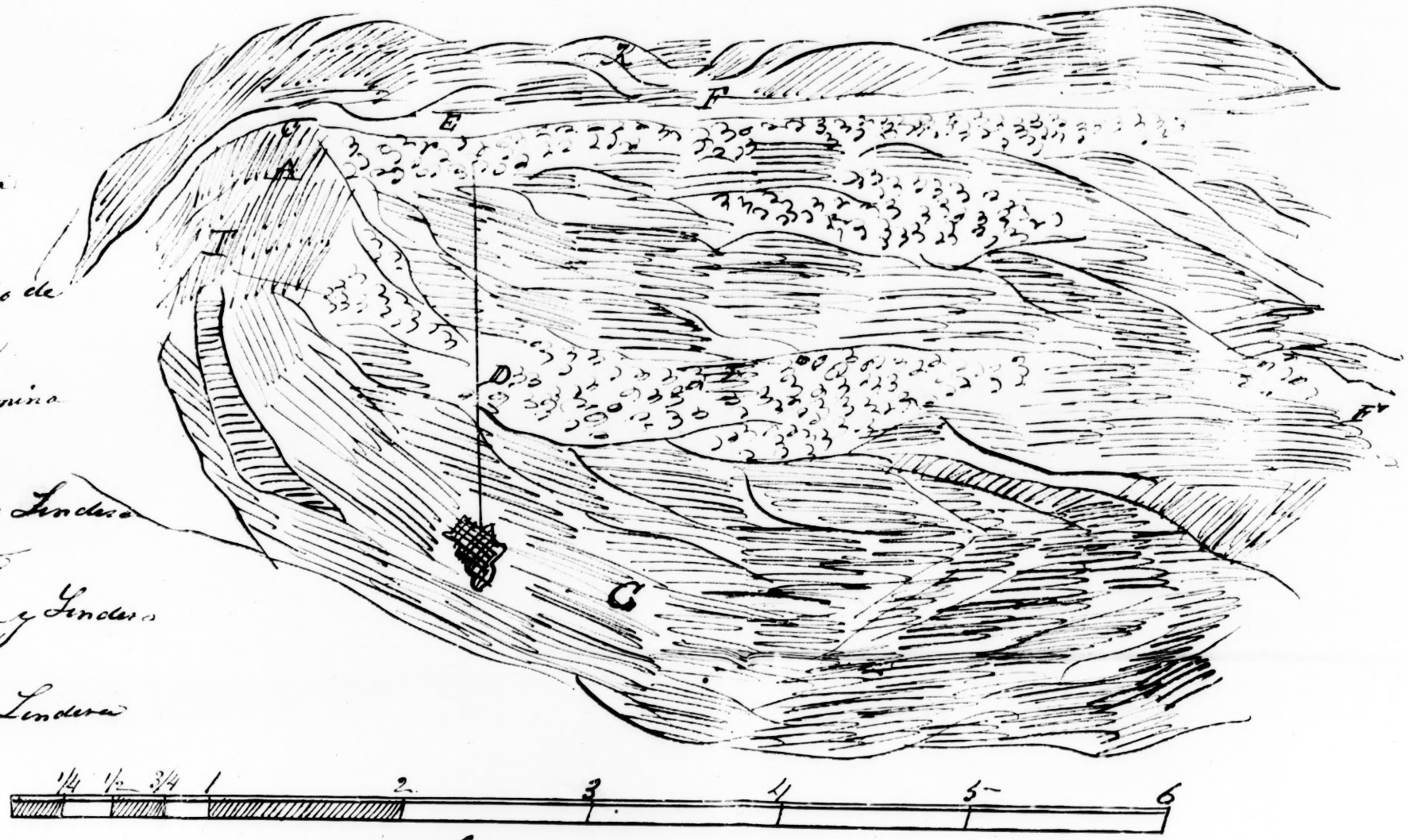
G Cañada de Sta Rosa y camina de los Alamos

H Lomas de Sta Rita y Lindero del Sitio pr el oaeste

I Cuchilla de Sta Rosa y Lindero pr el este

J Lomas llamada —— Lindero pr el Norte

K Lomas de las Cruses Lindero pr el Sur



Escala de Millas

No. 206. U.S. ños de Cota. Legua
page 39

Escala de media

Vendero de Sta. Pata

Lomas Muertas

Cañadas

Lomas Muertas

Cañada

Casa

Loma

Laguna

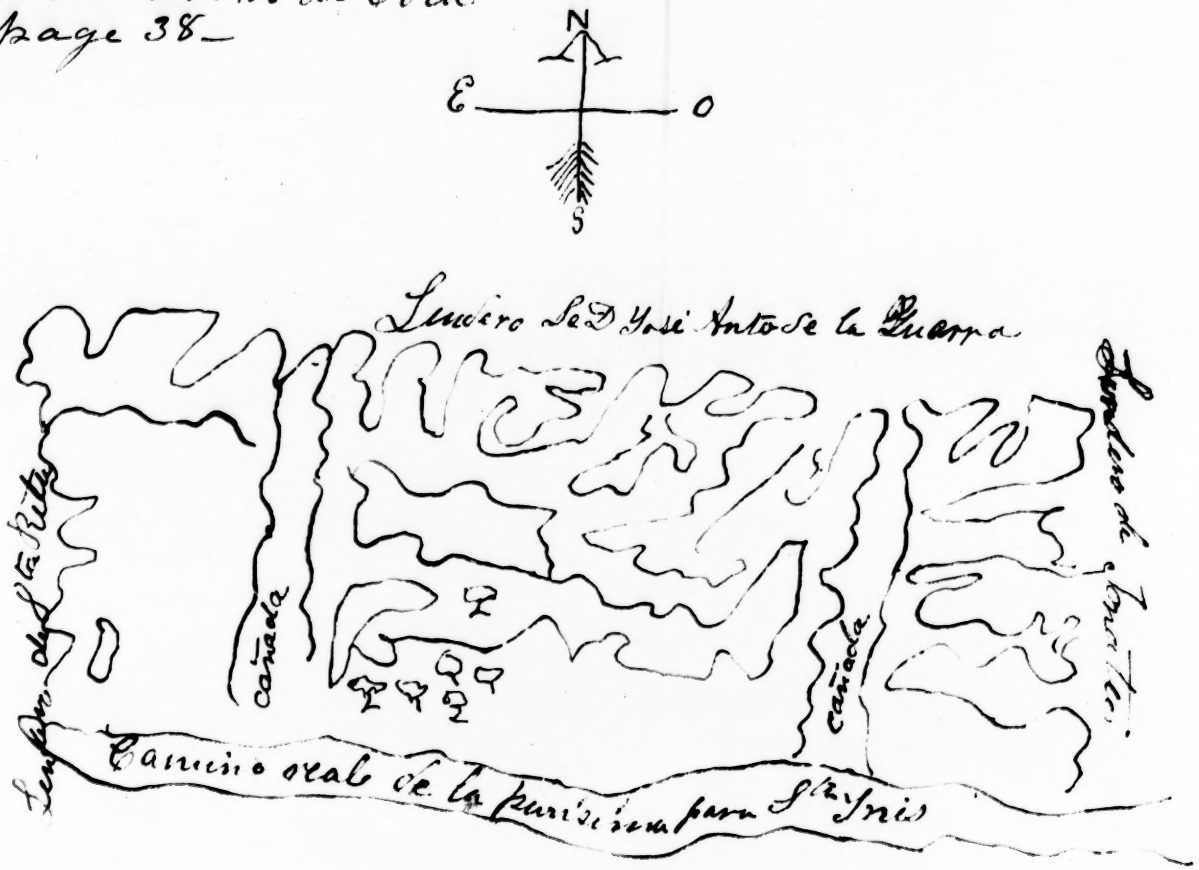
Camino real

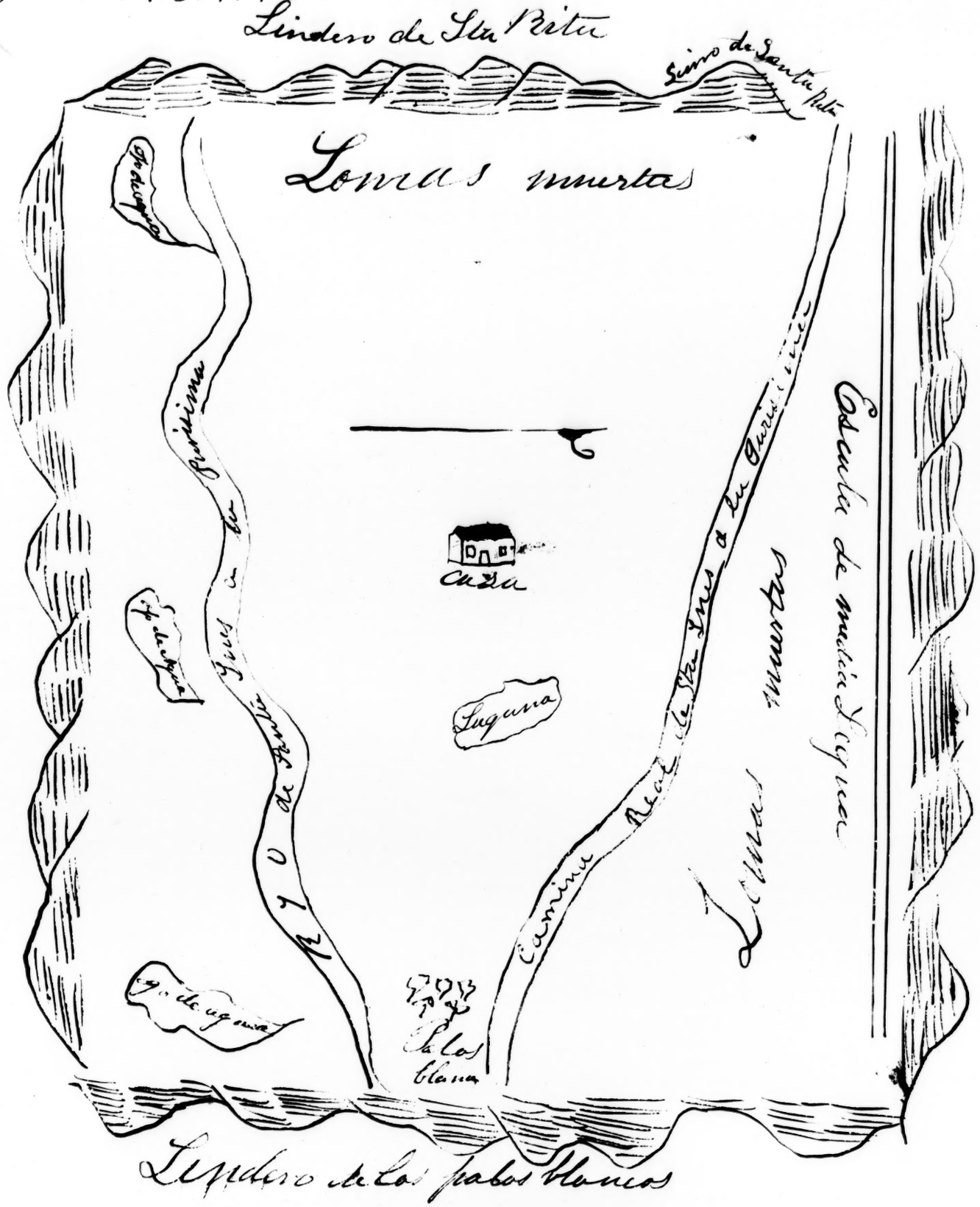
Cañada

Palas blancas

Vendero de las palas blancas

No. 206. U. S. ñs de Cotu.
page 38 –



El presentes torneos se compone de dos cetros poco mas ó menos

No. 206. U. S. Os de Cota.